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CONTENTS

	PAGE
Editorial Notes	569
Railway "Confiscation" Terms	571
Nationalisation of Inland Transport	571
Gas Turbine Locomotives	572
Wooden Sleeper Lengths	572
L.N.E.R. Staff Selection and Training—I	573
Letters to the Editor	574
Publications Received	574
The Scrap Heap	575
Overseas Railway Affairs	576
Modern United States Operating Methods	577
Gas Turbine-Electric Locomotive for G.W.R.	579
Gas Turbines for Railway Traction	580
New Medium Milling Machines	585
Personal	587
Government's Compensation Proposals for Railway Stockholders	589
Lords and Commons Debate Transport Nationalisation	590
Notes and News	594
Official Notices	595
Stock Market and Table	596

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Wages, Output, and a Buyers' Market

SOME of the complex problems which have arisen as a result of the Government policy of restricting free enterprise have been dealt with in a letter to the Editor of *The Financial Times* from Sir Frederick C. Stewart, who recently became Chairman of the North British Locomotive Co. Ltd., and has other considerable industrial associations. He points out that this policy has resulted in confusion of thought and lack of direction in industry. The controlling factor in business has become extreme caution, and nationalisation, or the threat of it, has discouraged and restricted the flow of capital essential to the building up of replacements, improvements, and extensions. He sounds a timely warning when he points out that overseas the foundation of our export trade is unfirmly set. Although at present Great Britain is operating in a sellers' market, it may well be that by 1950 there will be a buyers' market, in which prices and quality will be the controlling factors, and there will be no sale for inefficiently produced goods with high production costs. Sir Frederick Stewart points out that our first requirement is to maintain our cost of production at an economic level, and to ensure that a full week's work will produce an income which will allow a reasonable standard of living. There is danger in the fact that wage levels everywhere are increasing without the required amount of work to support them. Employers, whether State controlled or otherwise, and labour generally must realise that high wages can be paid and expected only in return for high production. The timely warning which Sir Frederick Stewart has sounded will be welcomed by an increasing number of industrialists who are gravely perturbed by current trends and by the apparent oblivion of the Government to the dangers inherent in them.

* * *

Sir William Halcrow's Address to the Civil Engineers

In his presidential address to the Institution of Civil Engineers on November 5—the 128th Session of the Institution—Sir William Halcrow departed from custom by speaking on a subject of general rather than specialised interest, the accomplishments of the Institution, particularly in the last fifteen years. He considered that the large number of engineering institutions represented an obstacle to the presentation of the views of the profession as a whole, and hoped that members would encourage union or, at least, co-ordination of effort. As regards the training of engineers, Sir William Halcrow thought that civil engineers should not place too much reliance on theoretical knowledge. Students should not specialise until after their school career; a good general education was the best foundation. Although British engineers had led the world for more than a century, they were reticent in making known their achievements. Members of the Institution should regard the future as holding unlimited opportunity for useful work in the interests of humanity.

* * *

First Class Travel Views

In recent issues of *The Spectator* there has been some correspondence on a perennial topic of controversy—first class railway accommodation. As usual, the suggestion has been raised that one way of overcoming some of the difficulties which arise would be the abolition of first class tickets and accommodation, and the substitution of one class travel. That this solution does not commend itself to all the correspondents of *The Spectator* is clear from the letters which we reproduce in our "Scrap Heap" page. It may be that this demand for one class railway travel is inspired partly by a dislike of the term "first class" as implying social distinction. As we pointed out in our June 14 issue, Sir William V. Wood, President, L.M.S.R., holds other views, which he expressed in a book entitled "Post-War Britain" (published by Eyre & Spottiswoode, 12s. 6d. net). He drew attention to the fact that those who consider that first class distinction on railways has a social implication, do not appear to object to the term when applied to a First Class in the Cambridge Tripos, or to advertisements of "first class typing." In Victorian days, railways described their superior accommodation as "carriages of the first class," which placed the emphasis on the vehicle rather than on its occupants.

Home Railway Traffic

The return of traffic receipts for the four main-line railway companies and the London Passenger Transport Board for the four weeks to November 3 showed a fall of £325,000 as compared with the corresponding period a year ago. Passenger revenue was lower by £940,000, but there was an improvement of £336,000 in coal and coke receipts and £279,000 in merchandise. For the previous four-week period the decline in total traffic was more than £1,000,000. Details of receipts for these four weeks of this year and the equivalent period of last year are compared in the table below, which also contains the aggregate revenues for the 44 weeks to November 3 last and the similar period a year earlier.

FOUR WEEKS ENDED NOVEMBER 3, 1946					
	1946 £000	1945 £000	+ or - £000	Per cent. + or -	
Passengers	14,383	15,323	- 940	- 6.5	
Merchandise	8,646	8,367	+ 279	+ 3.2	
Coal and coke	4,303	3,967	+ 336	+ 7.8	
Total	27,332	27,657	- 325	- 1.1	

AGGREGATE FOR THE 44 WEEKS OF THE YEAR					
	1946 £000	1945 £000	+ or - £000	Per cent. + or -	
Passengers	173,590	179,925	- 6,335	- 3.6	
Merchandise	88,848	104,952	- 16,104	- 18.2	
Coal and coke	42,221	40,701	+ 1,520	+ 3.6	
Total	304,659	325,578	- 20,919	- 6.8	

For the year to November 3 last the fall of £16,104,000 in merchandise receipts reflects the decline in Governmental traffic and the relative slowness of the increase of civil production, coupled with difficulties in the movement of freight, to which reference was made in our editorial columns last week. Nevertheless, the fact that for the period covered by the latest returns there has been an increase in merchandise revenue, albeit small, is encouraging.

Overseas Railway Traffic

The improvement in Argentine North Eastern receipts which began in the week ending October 26 was not maintained in the fortnight under review, for a gain of ps. 10,400 in the next seven days was counteracted by a decrease of ps. 27,700 in the nineteenth week. Aggregate results, however, are still ps. 68,500 ahead of last year. Entre Rios traffic has lost ps. 125,600 in the fortnight and are now ps. 168,900 down on the aggregate. The larger Argentine railways have recorded increases in both weeks, the best gain being one of ps. 670,000 on the Buenos Ayres Great Southern. Other total increases for the fortnight were ps. 523,750 on the Central Argentine, ps. 259,000 on the Buenos Ayres & Pacific, and ps. 69,000 on the Buenos Ayres Western. Results are compared in the table below:—

	No. of week	Weekly traffic	Inc. or dec.	Aggregate traffic	Inc. or dec.
Buenos Ayres & Pacific*	19	2,360	+ 110	41,893	+ 3,853
Buenos Ayres Great Southern*	19	3,161	+ 345	61,008	+ 3,474
Buenos Ayres Western*	19	1,241	+ 39	22,788	+ 1,292
Central Argentine*	19	3,292	+ 246	59,077	+ 1,517
Canadian Pacific	45	1,575,000	+ 123,750	63,472,750	- 5,833,000

* Traffic returns in thousands of pesos

A gain of £54,000 on the Canadian Pacific in the week ended November 7 was the first increase since the week ended September 30, when an improvement of £35,250 was shown. Aggregate traffic for the ten months to October 31 were £6,010,750 behind the 1945 results.

4-ft. Concrete Pipe Jacked through 5-Track Embankment

A problem that might occur on any railway was recently solved in Chicago by an unusual method. A 4-ft. dia. concrete service pipe—to carry an 8-in. water main and an 18-in. sewer—had to be laid under the five-track Pennsylvania Railroad main line at a point where it runs on an embankment composed of fine sand and some gravel. It was impossible to lay the pipe in a temporary open cut, as the traffic was too heavy; it consists of 70 to 75 high-speed passenger and heavy freight trains a day. Fear of settlement of the tracks also ruled out braced tunnelling. Accordingly, it was decided to force the

pipe through the bank with the aid of a hydraulic ram with a 6-ft. stroke, each section of pipe being 5 ft. long. Specially strong pipes with tongued and grooved joints were used, the leading section being fitted with a steel hood to act like a well-curb when being driven forward by the ram. Excavation was by manual labour, and 15 sections were successfully forced 75 ft. through the embankment. The maximum pressure required was 7,000 lb. per sq. in. or 185 tons.

Short and Long Fishplates

A significant feature of current track relaying work in Great Britain is a reversion from the use of 9-in. or 10-in. two-hole fishplates to the previous 18-in. four-hole standard. Much was hoped of the short fishbolt when it was first introduced. The economy in steel made possible by halving the length of the plate and the number of fishplates was relatively trivial in comparison with the fact that the joint sleepers and their chairs could now be brought close together, giving a better support to the joint than before, with advantage both to track maintenance and to the riding of rolling stock. But gain in one direction has been offset by loss in another. Whereas it was expected that fatigue breakage of fishplates would be reduced, the short fishplate has transferred the trouble to the rail. The tendency of the joint to pump up and down under traffic, even in the most minute degree, causes the short fishplate to exert a strong leverage under the railhead, and not a few rails have developed horizontal cracks in this way at the junction between the railhead and the web. The trouble has been worst where the effect of corrosion has been added to that of fatigue, as in damp tunnels or in the vicinity of water troughs, and has been accentuated by the very feature which was thought to be so advantageous—the close spacing of the two joint sleepers, which has made it more difficult than before to pack the ballast evenly under their entire width. Present indications seem to be that the short two-hole fishplate eventually will disappear.

Extension of A.T.C. in Switzerland

In November, 1933, the Swiss Federal Railways decided to adopt a uniform system of intermittent inductive automatic train control at all distant signals for the home signals, and by the end of 1938 the work had been completed. The preliminary trials had almost concluded when impetus was given to the matter by the serious collision in the Gütsch tunnel, Lucerne, on December 13, 1932. After the ordinary distant signals had been equipped, it was decided to fit the track apparatus to the approach speed warning boards wherever a reduction to 45 km.p.h. (28 m.p.h.) or less was called for. The equipment selected, of Swiss design, proved robust, reliable, and inexpensive. On October 2, 1942, a bad collision occurred at Tüschierz. The driver of an electric locomotive had fallen asleep and the dead man's control failed to operate. In consequence, the warning given by the distant signal for the starting signal went unheeded; the train over-ran the starting signal and entered the single-line section in advance, where it met another train head-on. It was agreed, therefore, in 1943, to equip all starting signals and their distant with the track inductors. Single lines were dealt with first, and the work still proceeds.

Sir William Wood on L.M.S.R. Locomotive Stock

In the current issue of *Carry On*, the L.M.S.R. staff newspaper, Sir William Wood, the President of the company, points out that the L.M.S.R. book stock of locomotives is 7,972, but 161 are still on loan to other railways and to traders. This reduces the operating stock to 7,811, which is further curtailed by the number under or awaiting repair. The company's aim is to have 90 per cent. of its operating stock actually available for service; this is an ambitious target in railway practice, and it is a tribute to the L.M.S.R. organisation that it has been maintained for long periods. At the present time the number out of service for repairs and so forth, is 1,065, or 13.6 per cent. of the operating stock. The total stock ready for service, therefore, is 6,746, which is 6 per cent. more than at September 1, 1939, but this is not a large margin in view of the increased traffic, especially as wartime construction

was concentrated largely on 2-8-0 freight locomotives. The conversion of steam locomotives to oil burning will mean that throughout the 12 weeks required for conversion, the L.M.S.R. will lose 80 locomotives which otherwise would have been available. The number of locomotives to be converted is 485, at a cost in the region of £900,000.

An Engerth Locomotive Scrapped

Several of the early Swiss lines used locomotives of the Engerth design, intended to unite flexibility with a compact framework and considered especially suitable for mountain routes abounding in curves. Engerth, a professor of mechanical engineering at Graz, Austria, prepared his own design in connection with the working of the Semmering route while a member of a committee appointed to consider designs submitted. We believe that these engines were built mostly by Kessler, of Karlsruhe and Esslingen, although other firms constructed some. Over a hundred were in use at one time in Switzerland, and one built by Kessler in 1857 and called *Speiser*, was until now the oldest Swiss engine at work. After the late sixties or so interest in Engerth's system died out and few more engines were constructed to it. It is announced now that *Speiser*, which, of course, had been much altered in the course of time, has been broken up. There is still, however, another Engerth engine in service, *Genf* (Geneva), dating from 1858, of a type at one time used by three Swiss lines.

Railway "Confiscation" Terms

LATE on Monday evening in the House of Commons Mr. Alfred Barnes, Minister of Transport, announced the Government's proposals for the compensation payable to the railways, canals, and the London Passenger Transport Board under the Bill shortly to be introduced to Parliament with the object of bringing the inland transport services under national ownership. His statement is reproduced in full elsewhere in this issue, but in effect the proposal is that compensation should be based on average prices of the stocks of the undertakings during the first six Stock Exchange working days of this month, or the average of the mid-monthly mean quotations from February to July, 1945, whichever is the higher. For each £100 nominal of stock, the holder will receive Government guaranteed securities equal in value at the date of issue to the transport stocks taken over on the above basis.

The best that can be said of the Minister's statement is that the proposal has the merit of simplicity and puts an end to uncertainties as to the basis of compensation the Government has in mind. From then onwards, however, there is nothing to commend the plan he has put forward. It may have been a coincidence that his announcement was made on a day when the prices of railway stocks were lower than they have been for some time, and in general below the levels which the Government proposes to take for compensation purposes. These low levels were themselves the outcome of apprehensions as to the Government's intentions, but no doubt they will afford a talking point for the nationalists, albeit a very weak one.

It has been widely assumed that the Government stock which will be issued in compensation to stockholders will bear 2½ per cent. interest. This is a reasonable assumption, and is based on present interest rates on Government securities. Mr. Dalton's policy of "cheap money" at all costs has already inflicted considerable hardship on a wide range of investors, but in the case of railway stockholders the loss of income indeed will be serious. Under the wartime financial agreement with the Government, the ordinary stocks of the main-line railways have been yielding 8 to 10 per cent. or even more on occasion, and preference shares not infrequently have been on a yield basis in excess of similar industrial securities. In the case of Great Western ordinary, for example, the yield at the time of the Government's announcement was about 8·9 per cent. and this will be reduced to 1·5 per cent. under the Government scheme. The yield to holders of L.M.S.R. ordinary will drop from 14·3 per cent. to 0·73 per cent. In the case of L.N.E.R. preferred and deferred, on which no payments have been forthcoming for years, the

holders will receive an income of slightly less than 3s. 8d. and 1s. 10d. respectively per £100 nominal of stock required. There is, indeed, ample justification for the comment which is made in the City Notes of *The Times* that a transaction of this kind can "hardly be free from the taint of confiscation." Holders of railway stocks include great numbers of persons in the low-income groups, and among institutional proprietors the insurance companies and trade unions are not the least important, while there is a possibility that some sections of railway staffs may be directly affected if any of their pensions fund balances are invested in railway stocks.

The total valuation, for compensation purposes, of the four main-line railways and the London Passenger Transport Board is approximately £1,019·7 millions, which compares with a nominal amount of securities quoted on the Stock Exchange of £1,142·1 millions. On a 2½ per cent. basis the cost to the Treasury of interest on compensation stock would be £25·48 millions, which compares with a net revenue of the railway pool in 1945 of £62 millions and a net rental payable to the companies under the wartime agreement of £43 millions, to which latter two figures must be added the net revenue derived from investments in road transport undertakings, and from ownership in railways in Northern Ireland or Eire, representing approximately a further £1 million, which are not included in the Railway Control Account. The net revenue of the four main-line companies in 1937 was £37·9 millions, and in 1938 £29 millions.

The "cloven hoof," to which we referred in our last week's issue, undoubtedly is being shown once more in the present proposals. The eagerness of the Government to secure substantial advances in railway rates and charges—the recent applications were made, it must be emphasised, not by the controlled undertakings, but by the Minister of Transport—is in striking contrast with public pronouncements decrying the "profit motive," and it is becoming increasingly clear that the intention of the Government is to consider transport as it does the Post Office, as a means of revenue raising, and, indeed, as a form of indirect taxation. Some support can be found for this view in the recent public Ministerial utterances that indirect taxation is to be preferred to direct income tax, and, if our suggestion is correct, the outlook for traders and travellers, and last, but not least, officers and staff, is, indeed, grim, for under a State monopoly activated by such ideals there is little doubt that all that has been promised in the way of great improvements will soon evaporate into thin air.

Nationalisation of Inland Transport

IN the House of Lords on November 13, Lord Portal, Chairman of the G.W.R., pressed the request of the four main-line railway companies and the Road Haulage Association for a public inquiry by an impartial tribunal before the Bill to nationalise inland transport was introduced. He argued that, once transport was nationalised, it would be impossible to make any changes, and it was, therefore, fair to the public and traders that they should be satisfied that the proposed change would be beneficial to the country. Further, the recent agreement between the railways and the Road Haulage Association provided for a large measure of co-ordination and a minimum of disturbance, while leaving ample scope for enterprise on a fair and competitive basis. In view of the present need for increased production and exports, he suggested this was not the time to make a drastic change in the country's transport arrangements.

Lord Balfour of Burleigh said that the question of the ownership of inland transport was irrelevant: what mattered was better co-ordination between rail and road services and the efficiency of the service to the public. He contended that the main-line companies were already big enough and that any step to a wider merger was fraught with the greatest dangers of incompetence and lack of efficiency. Finally, he asked the Government to consider the L.N.E.R. proposal that the Government should acquire the track, and that the companies should stand in relation to them as tenant to landlord.

The Lord Chancellor, in reply, agreed that in inland transport the question was not primarily ownership, but co-ordination between railways and between road and railway. He also agreed that co-ordination could be effected without

ownership, but his experience was that the simplest way was to secure ownership and then co-ordination could be achieved to any extent desired. The Government contended that there was no case whatever for an inquiry as the facts were known.

In view of the Lord Chancellor's reply, it is interesting to recall some of the statements reported to have been made by the Lord President of the Council (Mr. Herbert Morrison) on the subject. On May 22, 1945, at the opening of the Labour Party Conference at Blackpool, Mr. Morrison said: "It is no good saying we are going to socialise. . . . The electorate will expect to be shown why we want to do it and how the public interest will be advantaged." On August 17, 1945, when broadcasting to U.S.A., he is said to have stated: "There is only one justification for either nationalisation or private ownership—that is, efficient service in the interest of the nation. If private enterprise can do this, then let it remain." Broadcasting to Canada on January 10, 1946, he is reported as saying: "It is up to the nationalists to prove their case that there will be advantage by nationalisation. Let the argument be directed to the merits and let the test be the public interest."

No attempt has been made by the Government, however, to disprove the efficiency shown by the British railways, in peace or war. Indeed, at the annual public inquiries held before the war by the Railway Rates Tribunal, the railways' claim to have managed their undertakings with efficiency and economy has always been upheld by the Tribunal.

Gas Turbine Locomotives

WE publish elsewhere in this issue an article which outlines the thermodynamic principles of the gas turbine, with particular reference to locomotive applications. Although there does not appear to be any immediate prospect of obtaining overall thermal efficiencies comparable to the diesel-electric locomotive (*i.e.*, of the order of 30 per cent.), it is quite certain that an overall efficiency of 18 to 20 per cent. can be realised with a gas turbine locomotive, and there are prospects of further improvements with the use of higher combustion temperatures. In order to compare running expenses, however, the important quantity is the cost of fuel per b.h.p. hr. and not simply the thermal efficiency. A gas turbine can be fired with ordinary furnace fuel oil of about four-fifths the cost of diesel fuel. Also, the consumption of lubricating oil should be very small compared with diesel engines. The combined fuel and oil cost for a gas turbine locomotive should, therefore, be no greater than that for a diesel-electric locomotive of corresponding power output.

There are other factors which make up the running expenses of a locomotive, in particular the cost of maintenance, and in this respect it is much more difficult to assess the relative merits of gas turbine and diesel engine.

It is significant, however, that the gas turbine is much simpler mechanically than the diesel engine, so that once the gas turbine has passed through the initial stages of development, there is no reason to suppose that its maintenance costs would be any greater than those of a diesel engine. A further point is that, whereas with a high-speed diesel engine the limit of power output with a single engine unit is about 1,500 to 2,000 b.h.p., there is no apparent limit to the power output for which a single-unit gas turbine set can be designed, at any rate within the power range required for a locomotive. This feature of mechanical simplicity will become of increasing importance for locomotives of high power output.

At the present time numerous steam locomotives are being converted to oil firing as a result of the continuing shortage of coal. The overall thermal efficiency of a steam locomotive is about 6 to 8 per cent. Gas turbine locomotives could burn the same fuel oil, but at approximately *three times* the thermal efficiency of the steam locomotive. In other words, about three times the useful output of work could be obtained per gallon of fuel oil. The time-honoured justification for the use of low-efficiency reciprocating steam locomotives in Great Britain, on the assumption of an adequate supply of cheap coal being available, is hardly applicable now. In future, fuel economy will become a matter of increasing importance, and once the necessity of importing oil is accepted, the merits of diesel or gas turbine traction appear overwhelming.

Whether the diesel-electric locomotive, or its rival, the gas

turbine-electric locomotive, ultimately proves most suitable for traction in this country, will be decided by the relative degrees of reliability and availability that can be attained in each case. Diesel traction has already established itself in a very strong position in this respect.

Particular credit is due to the Brown-Boveri Company of Switzerland for designing and building the first gas turbine locomotive. This locomotive was completed in 1941 and has been employed in regular service both on the Swiss Federal and the French National Railways. Further Swiss developments with gas turbine traction will be awaited with interest. Elsewhere in this issue we give some details of a 2,500 h.p., 90 m.p.h., gas turbine-electric locomotive which the Great Western Railway has ordered from Brown-Boveri.

Another development of great importance is the possibility of using pulverised coal with gas turbines in place of oil fuel. This problem is being actively pursued in America, and two experimental coal-burning gas turbine locomotives have been ordered by the Locomotive Development Committee of Bituminous Coal Research Inc. If this is successful there will be an even greater incentive to make use of gas turbine traction.

Wooden Sleeper Lengths

A GREAT deal has been said and written during the past decade about various types of reinforced concrete and, more recently, cast-iron plate sleepers. As compared with the wooden sleeper, a greater measure of economy is claimed for them all, if not in prime cost, then in the long run. At the present time of acute timber shortage in this and other countries, there is, moreover, an even wider opening for sleepers made of other materials. Nevertheless, it must not be forgotten that the wooden sleeper is, and for many years is likely to remain, the standard and by far the most widely used in practically every country. The majority of engineers will also agree that it is in almost every respect still the most satisfactory type, with which no other can compare for resilience and cushioning of the track, and in numerous other ways. In America, particularly, with its inexhaustible timber resources, the use of the wooden sleeper is practically universal.

At present, Mr. L. Jeffords, the Chief Engineer of the Atlantic Coast Line system, is championing the cause of a wooden sleeper 9 ft. long for all lines carrying heavy traffic. Sleepers 9 ft. in length have been used in Great Britain, of course, but now survive only in some of the older sections of track; the 9-ft. sleeper on standard-gauge lines was adopted partly to facilitate gauge conversion if it should be required. The present British standard dimensions for 4 ft. 8½ in. gauge plain track are 8 ft. 6 in. × 10 in. × 5 in., although sleepers adjacent to joints are frequently made 8 ft. 6 in. × 12 in. × 5 in. Incidentally, the L.M.S.R. has suspended the use of these broader joint sleepers during the shortage of timber.

In a paper recently presented at a meeting of the Railway Tie Association in Cincinnati, Mr. Jeffords launched his appeal for the 9-ft. sleeper by pointing out that in 1905 the predominant size of sleeper in the States was 6 in. × 8 in. × 8 ft., and suggested that calculation for necessary strength and bearing surface for load transference was probably neglected in favour of acceptance of 8 ft. because this was half the general commercial lumber stock size of 16 ft. Even in 1924, most lines carrying heavy traffic had increased the size of their sleepers to 7 in. × 9 in. × 8 ft. 6 in. only. Actually, of the 97 lines then reporting to the A.R.E.A., two only were using 9-ft. sleepers. It was as recently as 1941 that that Association embodied a recommendation in its manual for the early adoption of this length of sleeper.

In support of this length, Mr. Jeffords points out that, to give balanced support for the rail, a 9-ft. sleeper provides 2 ft. additional length available for packing as compared with an 8-ft. sleeper. More resistance is also available to forces tending to distort the track, and considerably reduced maintenance results. As well as securing smoother riding, the longer sleeper minimises the risk of centre binding, so real when 8-ft. sleepers have to bear modern heavy loads. Finally, he claims that the increase in cost involved in using a longer sleeper is slight, and that a tree producing 8-ft. 6-in. sleepers will give an equal number 9 ft. long. His own system, which is replacing some 1½ million sleepers annually, is obtaining as many 9 ft. in length as are available.

L.N.E.R. Staff Selection & Training—1

IN our March 2, 1945, issue reference was made to the problem of the reinstatement of railway staff who, with the war in Europe drawing to a close, would soon be returning to civil employment. The reinstatement of staff is today well under way, and the methods adopted to solve this problem, and the kindred problems of the resumption of the staff training and special selection arrangements by the L.N.E.R., are typical in broad outline of the care which all companies have devoted to the subject.

Early in 1944, the L.N.E.R. reviewed comprehensively the whole of the expected post-war staff problems, and in October, 1944, secured the approval by the board of special machinery for dealing with reinstatement and the resumption of the schemes for the special selection of staff, staff education, and training. All these matters are of necessity closely related, but for convenience and clarity this and a succeeding article will be divided into sections dealing with the machinery which has been set up by the L.N.E.R., followed by descriptions of the several schemes mentioned and, finally, with the question of normal recruitment.

Machinery

Before the war, the Traffic Apprentices Selection & Training Committee selected traffic apprentices on behalf of the Chief General Manager, and it was assisted in the training of these apprentices by the Divisional Education Committees at the three area headquarters. With the outbreak of war, the activities in connection with special selection and training ceased, but with the return to more normal conditions the arrangements have been resumed, with certain modifications and improvements.

The functions of the main committee, as re-established, have been widened so as to take in the general responsibility not only for the selection and training of traffic apprentices, which was the extent of its pre-war functions, but also for the educational and training arrangements for the whole of the staff in the area departments. The title of the main committee accordingly has been altered to "Selection & Training Committee (Area Managers' Departments)." The composition of the committee is the Assistant General Manager (Staff) as Chairman, with a second representative of the Chief General Manager, and the three Divisional General Managers.

A new feature is the establishment of a sub-committee consisting of the three Assistant Divisional General Managers and a representative of the Chief General Manager, to prepare detailed matter for, and make recommendations to, the main committee, and in addition to co-ordinate the work of the three Divisional Training Committees. Each Divisional Training Committee is composed of the appropriate area departmental officers or their representatives, under the chairmanship of the Assistant Divisional General Manager. This machinery has been designed to deal with all the various aspects of the selection, education, and training of staff in the Area Managers' Departments, and there is provision for co-opting specialist officers at the different levels to assist as necessary.

Reinstatement

In fulfilling their obligations under the Reinstatement in Civil Employment Act, 1944, all companies have agreed that each employee returning from H.M. Forces should be welcomed back into the railway service by an interview. The L.N.E.R. reached the conclusion that these interviews would be of great value in assessing whether a man had potentialities which had been developed during service with the Forces and could be used to advantage in the railway service, or whether there were gaps in his railway knowledge which needed bridging by some form of refresher course.

For this reason, and to create the best impression with the returning staff, it was decided that each member of the salaried staff of the traffic departments in Class II and below should be interviewed on return by his district officer or by district officers sitting in committee; and that the interviews of traffic apprentices, former traffic apprentices, and staff in the Special Class or Class I should be conducted by the appropriate Assistant Divisional General Manager, assisted by a member of the Divisional Training Committee. Wages grade

staff are interviewed by local officers, and those who have distinguished themselves whilst in the Forces are seen by the district officers.

These interviewing arrangements are minimum requirements, and can be supplemented as necessary by interviews of the more promising men at headquarters. A careful record is kept of each interview, indicating both the man's service career and his railway potentialities. It is the function of the interviewing officers at each stage to seek to find the exceptional men for whom special treatment alike in their own and in the company's interests can be recommended. The results so far have been interesting, and numerous cases could be cited of men for whom special training has been provided, or for whom a transfer to other work, for which an aptitude is shown, has been arranged. Generally, there is reason to think that the staff is well satisfied with the arrangements.

Staff Training and Education

As has been recorded in our columns, in 1943 the L.N.E.R. opened at Darlington a residential all-line operating school for the purpose of giving intensive instruction in a four-weeks' course on control working. With the object of assisting the staff returning from the Forces to re-adjust themselves to railway work, a general operating syllabus was prepared, and this now forms the basis of refresher courses at the school for men who have come back to the company. There has been opened also a residential all-line commercial school, also at Darlington, where returning men for whom re-training is recommended may take refresher courses in commercial railway matters. Each of these schools can take 20 students at a course, lasting in each case for four weeks.

For the time being the schools are devoting their attention to re-training men returning from the Forces, and any returning member of the salaried staff who is suitable can be recommended for a course at one or other of the schools through the interviewing machinery, and in addition a certain number of relatively senior men who remained with the company, but for whom it is considered refresher courses will be beneficial. Both schools, however, in due course will turn to more junior courses for those not so far advanced in the particular subjects. The schools are permanent features and their use will long transcend their immediate usefulness in regard to rehabilitation.

Quite distinct and separate from the special courses at the all-line residential operating and commercial schools are the L.N.E.R. evening classes in railway subjects. For many reasons it was not possible to keep the classes going during the war, although correspondence courses in one or two subjects were continued throughout. During last winter, however, it was possible to resume classes in rules and regulations and block working, goods station work and accounts, and passenger station work and accounts, at a number of centres throughout the line. Now, through the ready co-operation of the universities on the company's system, the complement of university courses will also be given during the coming winter.

The titles of the courses will differ slightly from pre-war. The law course becomes "Law of Carriage by Rail and by Road"; the economics course is more appropriately titled "Elementary Economics with Railway Illustrations"; geography becomes "Economic Geography of the United Kingdom"; but in view of other requirements it has been necessary to shorten the course to 10 lectures. Two innovations are worthy of mention. First, there is to be a 10-lecture course in road transport economics; second, the lectures in railway operating are to be delivered by members of the L.N.E.R. staff under university auspices—a suggestion welcomed by the universities.

Thus, during the winter of 1946-47, the L.N.E.R. will be operating again the whole of its educational programme. These classes and courses are quite distinct from the special courses at the operating and commercial schools, and, as formerly, are open at large to any member of the clerical staff who wishes to devote the necessary time to widening his knowledge and qualifying himself for promotion. It should be mentioned that, although the initiation of these arrangements was dealt with by the Main Selection & Training Committee, it has been left to the area organisations to make all detailed arrangements.

(To be continued)

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Southern Railway Electrification

3, Tudor Avenue,
St. Leonards on Sea. November 13

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In connection with the map on page 524 of your November 8 issue, showing the proposed lines to be electrified in the Southern Railway £15 million scheme, there seems to me to be one link of vital importance that has been missed, and that is the section between Hastings and Ashford. If that particular section also is electrified, it would give another alternative route for both the Central and Eastern Sections from London to Hastings via numerous routes, and is, I think, very strategic.

Also, I think more development can be looked for at least between Hastings and Rye than will take place between Oxted and Horsted Keynes. Again, if a loop is put in eventually to by-pass Ashford on the journey from Dover to Hastings, this would encourage a good coastal service.

I think I am right in saying that Sir Herbert Walker was inclined to that belief, and he was a far-seeing man in railway development.

Yours faithfully,
N. WAKEFORD

State Management and Control of Indian Railways

10, Clark Street, Kalighat P.O.,
Calcutta-26. October 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I was informed of the review of my book, "State Management and Control of Railways in India," in the issue of *The Railway Gazette* dated July 19, 1946, by a reader on the South Indian Railway. I would have seen it earlier had not the local postal services been dislocated by the accumulations caused by a long strike and the Calcutta disturbances in August. It was only with considerable difficulty that I was able to get a copy on loan to see the editorial and the review you were pleased to devote to the book.

I need hardly state how grateful I feel for the handsome terms in which you have referred to the work in the editorial as well as in the review. I have to thank your reviewer particularly for drawing my attention to the discrepancy in the footnote on page 84, the first intimation I had of it since the book was published. A few lines missed out has caused the entire reference to look discrepant. I am having an addendum inserted in the copies in stock. As your reviewer may be interested, I am sending a copy of it, which may be passed on to him.

Yours faithfully,
L. A. NATESAN

[The footnote (No. 45 on pages 83 and 84) referred to above reads as follows: the addendum now inserted is the portion in italics: "45.—The nature of the difficulties experienced in the construction of the Kangra Valley Railway has to be borne in mind in considering the final cost of construction. The line

was by no means a solitary black sheep in an otherwise respectable flock: there was another to which it was later to be compared, the Khyber Railway, started by the Railway Board, without proper estimates, the unique experience of which unfortunately came too late to be of any use for the Kangra Valley. The character of the construction of the Khyber Railway was described by Sir Austen Hadow, Chief Commissioner, Railways, in a note supplied to the Public Accounts Committee for 1927-28. Sir Austen stated: 'The completion of the line and the overcoming of all the difficulties involved were considered a matter for congratulation in November, 1925, when the line was opened up to Landi Kotal, and there is no doubt that, if it had not been for the defective work subsequently discovered in some of the tunnels, everyone connected with the project would have been credited with a specially good piece of work.'

Continuing, Sir Austen dealt at length with the defects in the Khyber tunnels and the difficulties in building them. It will be obvious that the above footnote as published—without the italicised addendum—though apparently reasonable in its continuity, actually read as nonsense to anyone knowing the two railways, and it is little wonder that our reviewer felt impelled to call attention to the matter in the following words: "There is a certain amount of 'washing of dirty linen,' some of it, curiously enough, inadvertently, it would seem, for on page 84 Khyber railway tunnels appear to have taken wings to the Kangra Valley line, several hundred miles away."—ED., R.G.]

Buckeye Couplings—Prevention of Telescoping

34, Evington Drive,
Leicester. November 11

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Once again it has happened! According to this evening's newspaper, the L.N.E.R. train derailed at Marshmoor was travelling at 50 m.p.h., and twelve doctors and thirty ambulances quickly arrived, to find only three cases needing attention and none of these were serious! The reason was the superb performance of the buckeye couplings.

I have kept records and photographs of most railway accidents for twenty years, and am struck by the regularity of this performance. There was the Welwyn smash, when the front train, with buckeye couplings, went on to Scotland, and some passengers were not even awakened in their beds.

I understand that *never since they were introduced*, over 40 years ago, have coaches so fitted telescoped. How many lives have so been saved, and how much human damage has been avoided, one can only guess, but it must in both cases be quite considerable.

I believe the L.M.S.R. Royal train of 1942 is buckeye fitted. It would be interesting to know why, apart from their conspicuous exception, these eminently sound, almost miraculous devices have not been adopted generally.

It is said that coupling and uncoupling are not as easy as with the standard screw coupling. This may be so, but the L.N.E.R. seems able to manage nevertheless, and one hopes that a device of such proved worth is not rejected on such relatively trivial grounds.

And what about electric cooling, another L.N.E.R. speciality obviously making for safety.

Yours,
H. M. LACEY

Publications Received

Ministry of Town & Country Planning Maps.—The Ministry of Town & Country Planning has brought out two railway maps in its National Atlas series. They are drawn to a scale of 1:625,000 and are printed on paper. They may be purchased from Edward Stanford Limited, 12/14, Long Acre, W.C.2, at 5s. each.

Design of Steel Castings.—As a result of recent developments, steel castings are now applicable over wider fields of engineering than ever before, and to bring their advantages and characteristics to the notice of designers in every branch of industry to which they may be applicable, the British Steel Founders' Association, 301, Glossop Road, Sheffield, 10, is publishing a series of bulletins supplying in text and diagram full information on

the requirements of design. The first bulletin, for July, 1946, mainly is concerned with elementary principles of design, dealing with various ways of eliminating the causes of defects in castings, and a section is also provided embracing the choice of steels according to their physical properties. Future bulletins will cover such subjects as feeder heads, mouldability and the use of cores, effect of sharp radii and re-entrant angles, hot tears and pulls, and inspection methods.

Morgan Crucible Company.—The achievements of British industry during the war, when only the highest quality equipment could render effective the efforts of Service personnel, was something of which the country has every reason to be proud. It is a matter for satisfaction, therefore, that so many firms are placing on record their own story of

those years, before memory grows dim and perspective becomes blurred in the stress of peacetime battles to come. One such story is told in a book issued by the Morgan Crucible Co. Ltd., Battersea, London, S.W.11, whose factory was in the front-line area all the time, a fact which is emphasised by the novel type of wrapper consisting of a reprint from a captured German map showing the Morgan works and neighbouring targets clearly delineated. This publication, which achieves a high standard of production, strikes a specially personal note, many pages being devoted to a description of the wartime life of the worker. In the latter part of the book the supply to wartime industry of Morgan products, including crucibles, furnaces, refractories, carbon brushes, resistors, etc., is portrayed by diagram and in a series of excellent photographic reproductions.

It is no doubt regrettable that Mr. Williams should have had to stand between Newton Abbot and Plymouth, but I fail to see what bearing it has on Mr. Manley's complaint. The railway companies, by offering first class tickets for sale, are saying in effect: "If you care to pay a luxury tax, we will carry you in greater comfort." It seems to me inherently dishonest that they should blandly announce in their notices that the acceptance of this extra fee conveys no guarantee that they will fulfil their side of the bargain. A theatre-manager who sold seats twice over and refused to compensate the original purchasers would very soon find himself in the courts. There is, however, nothing on earth to prevent the railway companies from selling twice as many tickets as they have first class seats, and then calmly washing their hands of the consequences to the purchasers, as it seems the Southern did in the case of Mrs. Manley. It is foolish to cry "class distinction" and recommend the abolition of first class carriages. Every one has his or her little extravagance, and for some this takes the form of travelling first class. One could argue, *mutatis mutandis*, that the Savoy Hotel, the Café Royal, and the tailors of Savile Row should all be abolished because it is not every one's pet extravagance which is catered for by those admirable bodies.—C. M. Barlow, *The Cottage, Thruxton, Andover.*

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Goods Traffic Records

Goods traffic earnings of the South African Railways during the week ended August 17, amounting to £710,554, broke all records. The previous best, recorded during the week ended June 29, 1946, was exceeded by £24,730. During the second week of August, 90,960 trucks were loaded, the ninety-thousand mark being reached for the first time. The previous record of truck loadings was 88,831 during the week ended July 20 last. Tuesday, August 13, now holds the record for the highest number of trucks loaded on one day. The total was 16,129.

Railway Steamers

Ships of the South African Railways fleet have been playing an increasingly important part in the efforts of the Government to relieve the food shortage and to expand the trade of the Union. The administration at present has four deep-sea steamers at its disposal, two of which are prizes of war, chartered from the Union Government. It is proposed to purchase another five vessels, three of 9,000 tons and two of 4,500 tons and 3,500 tons respectively. It is the intention to expand the West African service, primarily with the object of providing shipping from the Union for such products as are in demand at West African ports, and for timber, palm oil, kernels, and other articles which South Africa must import from those areas. It is hoped, also, to begin a trade development service to the East Coast of Africa at some future date.

RHODESIA

Claim for Higher Wages

The Rhodesia Railway Workers Union has submitted to the Rhodesia Railways administration a claim for a 10 per cent. increase in basic pay, plus a revised cost-of-living allowance; this claim has been made only nine months after the award by the Railway Arbitration Tribunal of basic pay increases ranging from 9 to 12 per cent. In a statement by the General Manager, Mr. W. J. K. Skillicorn, the Rhodesia Railways have rejected the claim for the further 10 per cent. increase on the grounds that the arbitration award referred to above, which was made on February 21 this year, is binding on both parties until December 31, 1947.

WESTERN AUSTRALIA

Operating Improvements on Eastern Line

It has been announced by the Minister for Railways (the Hon. W. M. Marshall) that as a means of relieving congestion, increasing track capacities, and accelerating the services on the eastern line (Perth—Merredin), the State Government is to undertake two major improvements in control and signalling at a cost of £29,580. The work will comprise the introduction of train control on the Northam—Merredin section, at a cost of £7,320; and installation of automatic signalling between Wooreloo and Spencers Brook on the up line, and from Koojeda to Spencers Brook on the down line, at a cost of £22,260.

Mr. Marshall said that the improvements would shorten running schedules

and lessen the hours of duty of train crews. The new methods would eliminate delays and time lost through the stoppages necessitated by single-line staff working. They would reduce operating expenses, and would facilitate the handling of traffic in peak periods. The date of completion would be governed by the supply of material and equipment, which was not all available immediately.

Royal Visit to Western Australia

On September 30 the Duke and Duchess of Gloucester visited Western Australia and made a tour of the south-western portion of the State. The party arrived at Cunderdin airport by air direct from Canberra, and there joined a special train which provided a travelling home for the greater part of the next ten days. The Lieutenant-Governor's coach was re-decorated for the occasion, and other special cars containing dining, lounge, sleeping, and baggage accommodation, were included in the train, which was staffed throughout by railway employees. At the conclusion of the tour the Railway Department was complimented on the arrangements, which were carried out without hitch.

CANADA

Decorative Coach Interiors

Now that paint products, upholstery fabrics, and carpeting materials are becoming available, the Canadian National Railways and the Canadian Pacific Railway are developing schemes of interior decoration for passenger stock that will mark a considerable advance in brightness and modernity over pre-war standards. Interior decorators of the Canadian National Railways are working on a café car with green marbled floor, dark green lower walls, beige upper walls, and a cream ceiling. The upholstery is rust, and tables are cream-topped with a narrow rust-coloured stripe along the edge. Canadian Pacific colour experts have finished a similar type of car with dark green rugs, natural leather chairs, pale green walls with cream moulding, and a cream ceiling.

A new Canadian Pacific dining car has french-blue walls with a lighter shade of blue panelling, a dark maroon rug, dark blue leather furniture, and curtains with red, yellow, and blue stripes. The C.N.R. have a new dining car with panelled walls finished in clear varnish over light-toned natural wood, a rust-coloured carpet, and pale-green leather furniture. Sleeping cars, also, are being turned out in a variety of attractive colour schemes. As to exteriors, however, there has been no change so far from the Tuscan red of the C.P.R. and the C.N.R. dark green.

UNITED STATES

Radio Links for C.T.C.

A demonstration has been given by the Pennsylvania Railroad of the possibility of using commercial beam radio and line telegraph circuits for centralised traffic control signals in the event of the railway circuits being damaged by storms or floods. In this test the signal and points control impulses from the C.T.C. machine at Red Bank, on the Pittsburgh to Buffalo line, made a round trip of 900 miles before being applied to the normal cir-

cuits. They were transmitted to Pittsburgh, 65 miles away, over the railway company's wires, and were forwarded to Philadelphia, via Washington, over Western Union wires and cables. Onward transmission to New York was carried out by Western Union beam radio, and from there the impulses returned to Pittsburgh over telegraph lines. The final link from Pittsburgh to Red Bank was again by means of railway circuits.

About a fifth of a second elapsed between transmission of the impulses and operation of the signals and points. The return impulses, showing that the operations had been carried out, travelled to Red Bank by the same route in the reverse direction.

BELGIUM

Six Months' Railway Results

A heavy increase in all branches of traffic was recorded on the Belgian National Railways in the first half of the current year. Working receipts for the first six months of 1946 rose steeply to fr. 2,928 million, as compared with fr. 984 million for the same period of the previous year.

In comparing these figures it must be borne in mind, however, that the period January-June in 1945 included more than four months when the European war was still in progress, and part of the country was fighting ground. In addition, much of the Belgian railway system was still wholly wrecked last year. It has been the rapid progress in reconstruction that has enabled railway traffic to show such a considerable growth in recent months.

Working expenditure in the period under review amounted to fr. 4,111 million, as against fr. 2,891 million for the same period of 1945. After allowing for various items of miscellaneous income, the working deficit for the first half of 1946 was fr. 711 million, contrasting with a deficit of fr. 124 million for the same period of 1945.

AUSTRIA

Drastic Curtailment of Steam Trains

A communiqué issued recently by the Austrian State Railways described the serious position which had arisen from the stoppage of railway traffic on all steam-worked lines—except for limited operation of a few fast trains. Originally, it was announced that the stoppage would be limited to Sundays and holidays, but subsequently the withdrawal of steam services was extended to weekdays owing to the serious depletion of coal reserves. In the first week of November, however, some coal supplies were received from the Soviet authorities, and workmen's trains in the Vienna district were restored to about 30 per cent. of the previous number.

On account of the present position on the railways, wagons with consignments for Austria, and in transit through Austria for Czechoslovakia, Poland, Yugoslavia, Roumania, and Hungary are being held up in France and other countries of Western Europe. The "Arlberg Express," the only international fast train providing a regular connection between Austria and Western Europe, operated only to and from Vienna for a few days, the extension to and from Budapest having been discontinued owing to the coal position. Coal supplies for this train were obtained later from Hungary, and working to and from Budapest was resumed.

Modern United States Operating Methods

Southern Railway Officers' investigation of diesel-electric traction development

THE decision of the Southern Railway Company to adopt diesel-electric traction for passenger and freight subsidiary services within its area of electrification in south-eastern England, was recorded in our November 8 issue. This decision was the outcome of measures approved by the board of the Southern Railway Company after the study and recommendation by Sir Eustace Missenden, General Manager, of a report drawn up by a delegation which visited the United States early this year, and which consisted of Mr. J. L. Harrington, General Assistant to the General Manager, Mr. S. A. Fitch, Assistant Superintendent of Operation, Mr. M. S. Hatchell, Assistant to the Chief Mechanical Engineer, and Mr. S. B. Warder, New Works Assistant to the Chief Electrical Engineer.

The delegation was in the United States for about a month, and saw something of the work of nine railway undertakings and six manufacturers of railway equipment, supplemented by discussions with executives of the railways and contractors and by reference to various publications.

The objective sought by the Southern Railway is how best to achieve, on a sound economic basis, a progressive improvement in safe railway transport by increased speed, improved punctuality, more reliable freight transits, greater passenger comfort, and general public convenience, bearing in mind the inevitable future increase in road and air competition. This is the same task as confronts the American railway undertakings, but there are fundamental differences in the two countries, some of which are:—

Track density.—Track occupation generally in America is low by comparison with the Southern Railway; the number of train-miles per route-mile for 1938 on U.S.A. Class 1 railways was only 4,653, whereas the figure for the Southern Railway was 32,872.

Loading gauge.—Although the track gauge (4 ft. 8½ in.) is the same in both countries, the loading gauge in U.S.A. is 2 ft. 5 in. higher from rail level (15 ft. 6 in. as compared with 13 ft. 1 in.) and 1 ft. 9 in. wider (10 ft. 9 in. as compared with 9 ft.) than on the Southern Railway. The effect of these appreciable differences on the design of locomotives and rolling stock is most marked, particularly with diesel locomotives and saloon-type passenger rolling stock.

Axle loading.—The permissible maximum axle weights in the U.S.A. are in excess of those on the Southern Railway, and, therefore, no existing standard design of American diesel locomotive could be used on the Southern Railway.

Comparative Costs

The Southern Railway at present consumes in steam and electric traction about 1,100,000 and 350,000 tons of coal (including outside generation) a year respectively. If it is assumed that the work equivalent of one gallon of diesel oil is equal to 55 lb. of coal, then the complete replacement of steam traction by diesel-electric locomotives would involve the use of 180,000 tons of diesel oil.

At present prices in the United Kingdom, this would cost:—1,100,000 tons of locomotive steam coal at £2 10s. a ton, £2,750,000; 180,000 tons of diesel oil at £8 10s. a ton, £1,530,000.

The present costs in U.S.A. for these

quantities would be:—1,100,000 tons of locomotive steam coal at £1 a ton, £1,100,000; 180,000 tons of diesel oil at £4 a ton, £720,000.

Oil prices are affected by influences other than supply and demand. At the outbreak of the recent war, the cost of American crude oil at the well-head varied from 20s. to 40s. a ton, according to the location and extent to which royalties were due, and the price was maintained by legally enforced limitation of production. Today's dollar prices are little altered, but the sterling price is higher, due to the alteration in the exchange rate.

The pre-war United Kingdom annual consumption of petroleum products was 11.7 million tons, of which most was imported in the form of finished products, but a quantity of 2.2 million tons was distilled in this country in 1939; of these totals the proportion of diesel or gas oil was 590,000 and 160,000 tons respectively. A large-scale policy of dieselisation in this country would have an appreciable effect on the whole oil position, with corresponding reactions on the variety of industrial concerns which take a proportion of the available oil import.

Signalling Equipment

By the end of 1944, 68,223 route-miles (99,736 track-miles) of railways in the United States had been track-circuited and equipped with automatic block signalling systems. Moreover, 7,732 route-miles had been equipped with automatic train control, and 2,846 route-miles with a cab signal repeating the lineside signals. One new advance in cab signalling (with or without automatic brake application) is that on nearly 500 route-miles of the Chicago & North Western main line, on nearly 250 route-miles of the Santa Fe main line, on the Key System across the Bay Bridge at San Francisco, with a headway of 62½ sec., lineside signals are not provided except for one signal at stations, junctions, and crossing places (corresponding to our home signal). Except for this, reliance was placed on the cab signals with or without train control.

For passenger rolling stock in the United States, all-steel construction is used, and the vehicles take full advantage of the ample loading gauge and are 70-85 ft. long, compared with the normal length of 60-65 ft. in this country. Average weights are:—

Coaches	55.7 long tons
Parlour cars	64.1 " "
Pullman sleeping cars	67.3 " "
Dining cars	57.3 " "

The Southern Railway passenger coaches are lighter, smaller, and of different construction.

The development of the diesel locomotive in the United States has been impressive. In relation to shunting services, the high availability, generally accepted as 95 per cent., of the diesel-electric locomotive, as compared with the usual average of not more than 68 per cent. of the steam locomotive is noteworthy. This would indicate that five diesel units would replace seven steam locomotives in shunting service, assuming the motive power required at any yard is sufficient to support the ratio.

In an assessment of relative costs, it may be pointed out that the operating costs of steam and diesel-electric motive power are not dissimilar on a locomotive-mile basis,

but the superior operating characteristics of the diesel-electric enable it to perform more work over a given period, and thus to show a progressive saving when computed in terms of work done. The steam locomotive has a decided superiority in first cost and depreciation, and in interest, taxes, and insurance.

The diesel-electric is at an advantage if sufficient steam power can be displaced to offset the additional first cost. The electric will have some advantage over the diesel-electric on the basis of its long life.

The steam locomotive is at a disadvantage in consideration of overload capacity, high acceleration, availability, flexibility, use factor, and freedom from complete breakdown. The diesel-electric shows an advantage in all but the first of these, and the electric in all but the last.

The diesel locomotive has made striking advances in the United States. It is incontrovertible that the diesel-electric locomotive, if properly maintained, is an efficient means of motive power. Compared with the steam locomotive, it has many operating advantages—it attracts passenger traffic and, in suitable workings, shows good financial results.

In dealing with the possible use of diesel traction on the Southern Railway as an alternative—or partial alternative—to further electrification, three straightforward courses may be advanced (a) to watch for the development of a possible new motive power unit, such as the gas turbine; (b) to follow the trend of current American practice by the renewal of life-expired motive power by diesel-electric locomotives on a comparatively short-life basis; (c) to proceed with the extensions of electrification.

Gas Turbine Developments

The view might be held that the gas turbine holds the greatest possibilities for the future, and that it would be wise for the Southern Railway Company to assist manufacturers in its experimental development and not to embark on further electrification or to introduce diesels. There are obviously dangers in waiting for a development that is "just round the corner," and the practicability of the gas turbine for large-scale railway motive-power service is unlikely to be solved completely in less than ten years, and the co-operation of the railway company in its development is an unknown expense. To withhold the economic and operating advantages to be secured from other existing forms of motive power for such a period and for such a problematical result would be wrong. It is, moreover, certain that the gas turbine locomotive will be expensive in first cost.

If alternative (b) were adopted, diesel-electric locomotives would be acquired each year, in conformity with the normal, or an accelerated, renewal programme: no further extensions of electrification would be undertaken, and some reduction of electrified mileage might take place as fixed equipment required replacement.

Such a policy would obviate any further capital expenditure on fixed electric installations. There would, admittedly, be some initial expenditure on diesel maintenance plant, which might be considered as replacement of life-expired machines and shops for steam engines; otherwise, the expenditure of a capital kind would be limited to the amount by which the diesels exceeded the current building costs of the replaced steam locomotives, after making allowance for the lesser number of diesel-electric locomotives that would be re-

quired. An up-to-date method of motive power would thus be introduced without great financial outlay: under present conditions this appears an attractive policy.

A third course (c) is to proceed with extensions of electrification. The density of traffic over a number of lines of the Southern Railway is such that electrification at present is the most economic method of traction, and further financial and operating advantages would result from the more intensified use of the existing electrified system.

Course Advocated

It is suggested that not one of the three courses outlined forms an entirely satisfactory basis for the future motive power of the Southern Railway. A fourth course—a combination of electrification and dieselisation—can be considered. In principle, electrification extensions would be limited to the routes which would fully justify the initial expenditure on fixed equipment. Auxiliary operations—including improved services on secondary and branch lines connecting with electrified routes—would be provided by the introduction of diesel-electric traction. Such a scheme would secure the best features of alternatives (b) and (c).

It may well be that this further alternative offers, under present conditions, a better foundation than any of the others for the motive-power policy of the Southern Railway. No doubt it is for this reason that the Southern Railway has indicated that it is pursuing investigations on the following lines:—

(1) Further electrification should be initiated, in general, on lines with a high density of traffic, priority being related to the proportion of steam train mileage over lines already electrified.

(2) Electric traction on routes already electrified, or to be electrified, should be used for:—

(i) Passenger trains, multiple stock for preference.

(ii) Trunk freight trains operating between, and calling only at, departure and reception roads of yards that can be equipped satisfactorily with a contact system.

(3) Diesel traction should be introduced within the area of electrification for:—

(i) Trains, passenger and freight, on lines on which electrification is not justified, subject to the services over such lines being recast, to make possible maximum use of the diesel-electric equipment.

(ii) Marshalling and station yard shunting.

(iii) Freight trains of a pick-up character along electrified routes.

Restricting Capital Expenditure

These projects, if adopted, would restrict capital expenditure on fixed electrical equipment to those routes likely to show the greatest return. The problem of performing electrically the miscellaneous requirements of the many goods yards of varied size and layout and private sidings—not yet solved practically—would not arise. The need for overhead wires in sidings and pentographs on electric locomotives might be obviated. There is certainly some disadvantage in perpetuating two systems of motive power within an area, but varied traffic requirements appear to necessitate it. Apart from this, it may be considered that the hazard of having "too many eggs in one basket" should be avoided.

Diesel-electric traction would fit in well with electrification by standard of per-

formance and by the requirements of maintenance being similar in many respects. Fuelling points for the diesel would have to be installed and watering facilities adapted, but there would be no need to retain turntables, bunkering plants, ash removal, and other facilities associated with the steam locomotive. The introduction of diesel-electric traction to the extent indicated would result in a greater degree of operational flexibility, as the diesel-electric locomotives would, if required, be available to work away from the electrified system.

The observations already made have particular reference to the area now being considered for future electrification. It is suggested, however, that it would be unwise to restrict the lessons of American experience to this section of the Southern Railway. It may be found that the main-line diesel-electric locomotive could be introduced with advantage on the trunk services for passenger and freight on the Western Section. The limitations imposed by stopping for water in the absence of troughs would be overcome, and the ability of the diesel to take an overload for a short period should result in better performance up gradients, without the need for banking assistance. Frequency of services should permit of a high measure of utilisation. It would be quite possible for one diesel-electric locomotive to do, in 24 hours, three single trips, Waterloo to Plymouth (702 miles in all); some timetable modifications might be necessitated to obtain full use of the motive power, but this would probably give a better service, with the potentialities of a greater revenue.

Types for the Southern Railway

So far as the Southern Railway is concerned, these are merely ideas: so they must remain, until there are means of securing in Great Britain diesel-electric locomotives of the types required at a reasonable cost. This means, first of all, design for British conditions and, in particular, Southern Railway conditions, and then production. Design must result from interdepartmental co-operation and also co-operation with the manufacturers. The types of diesel-electric locomotives in mind are as follows:—

Type "A"—Yard shunter for internal work at large yards. The design should embody recent advances in the U.S.A. and should be an improvement on the existing Norwood Yard locomotives. It is suggested that they should be about 400 h.p.

Type "B"—Shunting and running line locomotive for duties on lines other than those of the highest traffic density. This engine would be required to work stopping and semi-fast passenger trains (including excursions and specials at holiday periods) and pick-up freight services. It should be capable of a speed of not less than 65 m.p.h. and also of shunting at intermediate stations. A boiler for steam-heating of passenger trains and automatic brake should be installed. A unit of the order of 1,000 h.p. is indicated.

The possibility should not be excluded of designing the yard shunting locomotives (Type "A") to work in multiple for Type "B" service provided that a suitable range of speed can be obtained. As a further alternative, consideration should be given to incorporating equipment to enable the locomotives to operate with current from the third rail in order to ascertain whether such a design could be justified either economically or from the operating point of view.

Type "C"—Main-line locomotive for hauling passenger trains (generally outside the electrified area) of 500 tons, up to a maximum speed of 100 m.p.h. It is suggested that about 2,500 h.p. is required for this purpose. Modification of this design by varying gear ratios might be introduced later for freight and mixed traffic. Steam heating and automatic braking would be required. The design should be such as to obviate turning and pay particular attention to housing the engine of the horsepower specified in the shortest possible length, to obviate difficulties at terminal stations.

SOUTHERN RAILWAY "INVICTA" POSTER.

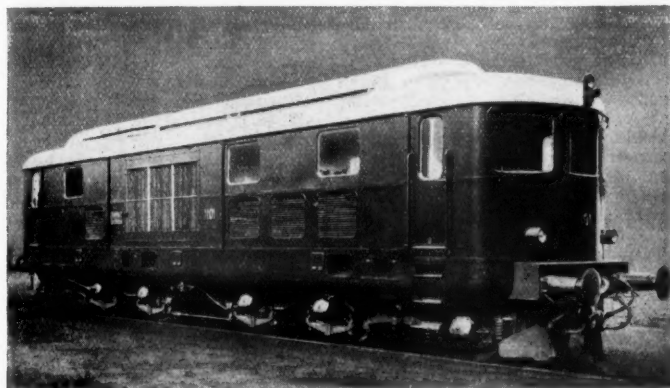
—To mark the introduction of the new cross-channel steamer *Invicta*, in the "Golden Arrow" service, the Southern Railway has brought out a new poster depicting the vessel leaving Dover against the background of the famous white cliffs. It is by Norman Wilkinson and is the first of that artist's designs for the Southern Railway.

REPAIRS TO AIR RAID DAMAGE AT KINGS CROSS, L.N.E.R.—During the week-end November 16-17, another important step was taken in repairing the damage at Kings Cross, L.N.E.R., sustained during an air raid on May 10-11, 1941. Sections of three arched ribs, which, when completed, will each weigh 9 tons, have been erected in the present gap in the roof over the main-line departure platforms. Each rib has a span of 105 ft. and the ribwork will be completed during the week-end November 23-24. A total of 132 tons of steel is involved in this restoration undertaking. No fewer than 3,120 pieces of glass, covering a total area of nearly 51,000 sq. ft., will be contained in the new roof, and the total amount of paint needed will be 1,500 gal.

STAFF NEGOTIATING MACHINERY.—Mr. H. C. Lang, Assistant to the Chief Officer for Labour & Establishment, Southern Railway, read a paper on staff negotiating machinery at the fortnightly meeting of the Southern Railway Lecture & Debating Society held on November 14 at the Chapter House, St. Thomas Street, S.E.1. Mr. Lang, who referred to staff negotiating machinery as the bridge between the staff and the management, traced its history and development over the past four or five decades, specially mentioning the first major development, the introduction of a procedure known as the Railway Scheme of Conciliation and Arbitration, 1907, which had derived its powers under the Conciliation Act of 1896. From this early beginning, Mr. Lang then spoke of the establishment of a complete scheme of machinery for all the staff generally at the end of the 1914-18 war which provided for local departmental committees, sectional, and railway councils, and the central and national wages board, and then on to the existing machinery of negotiation which came into operation on March 1, 1935. After enlarging on this machinery at some length, Mr. Lang submitted that the scheme as a whole was not merely a vehicle for redressing grievances, but an instrument conferring partnership rights and privileges, excluding, of course, the over-riding responsibility that the management must exercise. Mr. O. W. Cromwell, Chief Officer for Labour & Establishment, presided. Mr. A. C. J. Payne moved a vote of thanks to the speaker, which was seconded by Dr. Haydon, the Chief Medical Officer.

Gas Turbine-Electric Locomotive for G.W.R.

Brown-Boveri 2,500 h.p., 90 m.p.h., gas turbine-electric design carrying fuel for 250-mile non-stop runs



A similar but smaller gas-turbine locomotive supplied to the Swiss Federal Railways

AS announced in our October 25 issue, British Brown-Boveri Limited, 75, Victoria Street, S.W.1, has on order for the Great Western Railway a 2,500-h.p., 90-m.p.h., gas turbine-electric locomotive. The locomotive is being designed and constructed by Brown-Boveri & Company, Baden, Switzerland.

The principal details of the G.W.R. locomotive are as under:—

Continuous net output of the gas turbine unit ...	2,500 h.p.
Tractive effort at the wheel rim:—	
At starting ...	33,000 lb. from 0-20 m.p.h.
Continuously ...	13,000 lb. at 60 m.p.h., and 8,800 lb. at 90 m.p.h.
Maximum continuous speed ...	90 m.p.h.
Weight in running order ...	About 113 tons
Weight for braking ...	About 113 tons
Adhesive weight ...	About 75 tons
Length overall ...	65 ft. 6 in.
Fuel ...	Furnace fuel oil

We learn that the trailing weight corresponding to a tractive effort of 13,000 lb. at 60 m.p.h. is about 850 tons, but a trailing weight of 1,200 tons can be hauled at

speeds up to 40 m.p.h. continuously and 50 m.p.h. intermittently. The locomotive carries sufficient fuel for 250 miles, making it suitable for non-stop runs from Paddington to Plymouth.

A similar locomotive, but of somewhat smaller capacity, was built by the same firm some five years ago for the Swiss Federal Railways, and is illustrated herewith. This technical achievement aroused considerable interest all over the world, as it was the first time this new form of motive power had been adopted for traction work. It is the only locomotive of its kind in regular service.

In the gas turbine-electric locomotive the heat content of the fuel oil is converted directly into mechanical energy without, for instance, water as an intermediary, as in the case of the steam locomotive. The mechanical energy thus produced is transmitted electrically to the locomotive driving axles.

The gas turbine unit consists essentially

of an axial flow compressor, a heat exchanger, a combustion chamber, and a gas turbine. The compressor is driven by the turbine, and the air, which is compressed to about 45 lb. per sq. in. in the compressor, is fed to the combustion chamber through the heat exchanger. In the combustion chamber, the fuel oil is consumed with only a portion of this air, the remaining, and much greater, portion of the air by-passing the actual combustion chamber and mixing with the products of combustion in order to reduce the combustion temperature to a maximum temperature of about 1,100° F. before the turbine. This mixture of air and products of combustion is expanded through the turbine, and useful work is produced. The turbine exhaust gases escape to the atmosphere through the roof of the locomotive after passing through the heat exchanger. In the heat exchanger, a portion of the heat in the exhaust gases is transferred to the air being delivered to the combustion chamber, the temperature of the air thus being raised to about 500° F.

At full load the turbine develops about 10,300 h.p., the compressor absorbs about 7,800 h.p., and the difference of 2,500 h.p. is transmitted to the generator set through a reduction gear. The function of the electrical equipment is to convert the available mechanical energy produced by the gas turbine unit into electrical energy, and to transmit this to the driving axles by means of electric motors. The locomotive is carried on two six-wheel bogies, the outer axles of each bogie being driven by series type d.c. motors, completely suspended to reduce the unsprung weight to a bare minimum. Driving cabs, giving unobstructed look-out, are at both ends, so that the locomotive is suitable for running in either direction without turning. One-man control is provided, as well as the standard G.W.R. safety arrangements working in conjunction with the signals.

Compared with highly efficient express steam locomotives of the types at present being used on the Great Western Railway, it is stated that the fuel consumption of the gas turbine-electric locomotive will be less than half for equal work done.

Doubling the Gotthard Route

WITH the completion of double track on the Rivera-Taverne section, the process of doubling the whole length of the Gotthard Railway is nearing completion. From Arth-Goldau, in the north, to the Italian frontier station of Chiasso, the only single-track sections now remaining are those between Brunnen and Sisikon, alongside the Lake of Lucerne; and between Melide and Maroggia, on the Lake of Lugano.

On the Brunnen-Sisikon section, work on the second track is already in progress. The piercing of the first of the two tunnels on this section was recorded in *The Railway Gazette* of March 1. The plans for the Lake of Lugano are linked closely with a project for regulating the water level of the lake, which will necessitate new embankments for roads and railways.

As far back as 1869, when the original agreement for construction of the Gotthard Railway was entered into by Switzerland, Italy, and Germany, double-tracking of the line was envisaged, and the Gotthard Tunnel, as well as other important tunnels on the line, were constructed from the first to accommodate two tracks. In 1876 a financial crisis forced the Gott-

hard Railway Company to reduce its initial capital expenditure, and most other sections of the line were built for single-line operation only. However, almost immediately after the opening of the line in 1884, the development of traffic exceeded all expectations and called for the successive provision of double-tracking.

Because of the great engineering difficulties, and to the interruptions caused by the two world wars and the periods of economic crisis between them, the process has been spread over many decades. When, in 1909, the line was taken over by the Swiss Federal Railways, the whole of the principal mountain section, between Erstfeld and Bellinzona, was doubled. Further sections followed soon afterwards.

After the first world war, priority was given to electrification of the line, which necessitated the replacement of most of the iron bridges by stone bridges. In the course of these works, the section between Giubiasco and Al Sasso also was doubled. In 1934, the fiftieth anniversary of the opening of the line was celebrated by the inauguration of the second Monte Ceneri Tunnel, more than a mile in length, which carried the second track through the mountain range south of Bellinzona.

The works completed on the Rivera-Taverne section concern a length of line immediately south of the Monte Ceneri tunnels. This section is about 5½ miles long and follows the course of the Vedegia Valley.

In its upper part, the Vedegia Valley is rather featureless. Here, engineering works were confined mainly to the elimination of level crossings, and to the drainage of areas cut off by the railway embankment. In its lower part, however, between Mezzovico and Taverne, the valley becomes a ravine, so that the work called for rock blasting, earth movements, and engineering works of some magnitude.

SALE OF MACHINE TOOLS.—About 350 machine tools will be offered at an on-site sale which the Ministry of Supply will hold from December 11 to 17 at the premises of A. V. Roe Limited, Harrogate Road, Yeading, near Leeds. Included among the machine tools will be autos, capstan and turret lathes, drilling, grinding and milling machines, and various miscellaneous types. The sale will be held daily (Saturday and Sunday excepted) from 10 a.m. to 4 p.m.

Gas Turbines for Railway Traction

An outline of the thermodynamic features of gas turbines with particular reference to locomotive application

THE development of gas turbines in Great Britain has been associated almost exclusively with aviation, but there are many other fields of application for the gas turbine, notably in the generation of electric power and for use as a prime mover in a locomotive. It is principally in Switzerland that combustion turbines have been developed in recent years for this type of heavy engineering application.

With the conclusion of the war, however, the concentration of research and design facilities in Great Britain on aircraft turbines presumably will be reduced to some extent, and there is every reason to suppose that manufacturers will turn their attention to the construction of gas turbines for power generation.

For railway traction the gas turbine is likely to find its application as a rival to the diesel engine in the higher power

"closed circuit" types. The essential difference is that with the open circuit turbine, internal combustion is used, that is, the fuel is burnt in the air stream and the products of combustion pass through the turbine; whereas with the closed circuit turbine, external combustion is used and the exhaust air from the turbine is cooled and then returned to the compressor.

There are actually a number of different cycles which may be used, and some of these are illustrated by diagrams in Fig. 1 (a to d). The most simple layout is the open circuit arrangement shown in Fig. 1a, and the working cycle in this case is essentially Joule's constant-pressure air cycle. A development of this layout, with the addition of a heat exchanger, is shown in Fig. 1b; the exhaust gases from the turbine are used to pre-heat the air before entry to the burner, thus achieving an increase

cycle is achieved. This is, in effect, a modern approach to the reversible cycle employing a regenerator which was first suggested by Robert Stirling in 1827 and later revived by Ericsson. The two great merits of the closed circuit are: (1) that the turbine operates with clean air; and (2) that the whole circuit can be put under pressure, *i.e.*, the lowest pressure in the cycle is kept at a level above atmospheric pressure, so that the rate of heat transfer is increased and the surface areas of the heat exchangers are correspondingly reduced.

As far as thermal efficiency is concerned, the two most attractive systems are the closed circuit of Fig. 1d and the two-stage open circuit of Fig. 1c, with heat exchanger and intercooling between compression stages. However, both these systems have a grave disadvantage as regards application to locomotives. A supply of cooling water is required, and the gas turbine in either of these forms therefore presents the same problem as the condensing steam turbine when applied to locomotive practice.

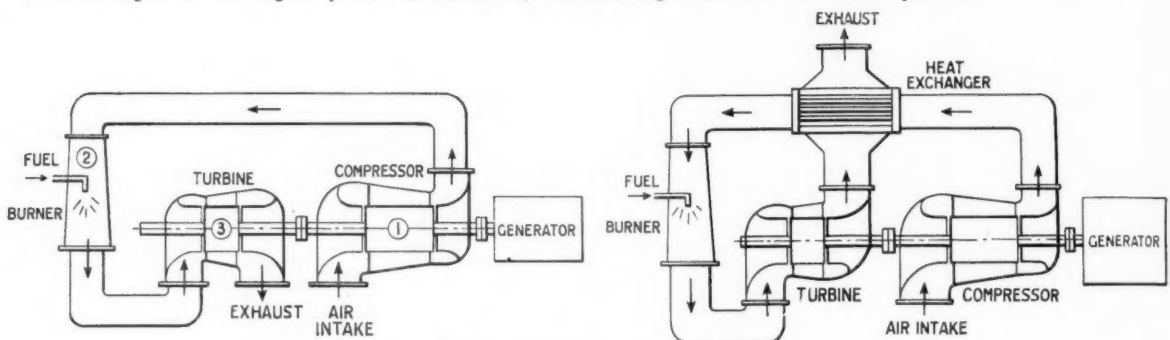


Fig. 1a (left) and 1b (right)—Alternative arrangements of open-circuit gas turbine

ranges. As with diesel power, electric transmission will be essential, and, in fact, the electrical features of the gas turbine locomotive will resemble closely those of the diesel-electric locomotive. It is simply a question of substituting a different prime mover for generating the electric power.

It is not yet possible to assess accurately the relative merits of the gas turbine for railway traction as compared with the diesel engine, in particular as regards availability, because gas turbines are still in the early stages of development. However, one can at least investigate the possible range of thermal efficiency of gas turbine locomotives, and thus form some idea of their operating costs.

Gas turbines are referred to usually as being of either the "open circuit" or

in thermal efficiency. A further development of the open circuit arrangement is shown in Fig. 1c, where the compression and expansion are divided into two stages, an intercooler is provided between the compression stages, and a second burner between the two turbines. This more complex layout achieves a still greater thermal efficiency and clearly the multiplication of stages could be carried further.

Fig. 1d represents the closed circuit scheme. This can be regarded as a logical development from the multi-stage open circuit turbine with heat exchanger shown in Fig. 1c. By substituting externally-fired heaters in place of the burners, and by passing the exhaust air from the turbine through a cooler and then returning it to the compressor inlet, an entirely closed

Because of this cooling problem, the choice of a gas turbine system for a locomotive must be restricted to the open circuit arrangement of Fig. 1a or 1b; or to a two-stage open circuit system similar to Fig. 1c, but without any intercooler between the compression stages. These systems have the merit of extreme mechanical simplicity and relatively small weight and bulk.

Simple Open-Circuit Turbine

In the simple open-circuit arrangement of Fig. 1a, air is taken in at atmospheric pressure and temperature, compressed in an axial flow compressor (1), and then passes to the combustion chamber (2) where liquid fuel is burnt continuously at constant pressure. The hot gases from the

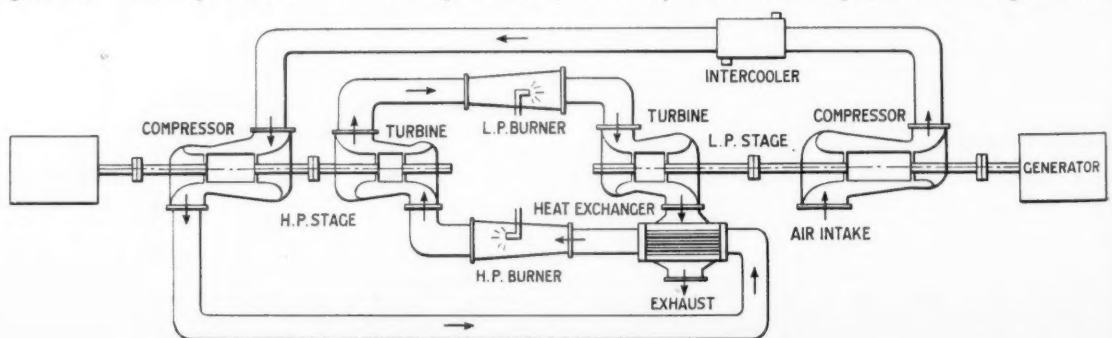


Fig. 1c—Open-circuit two-stage turbine with intercooler

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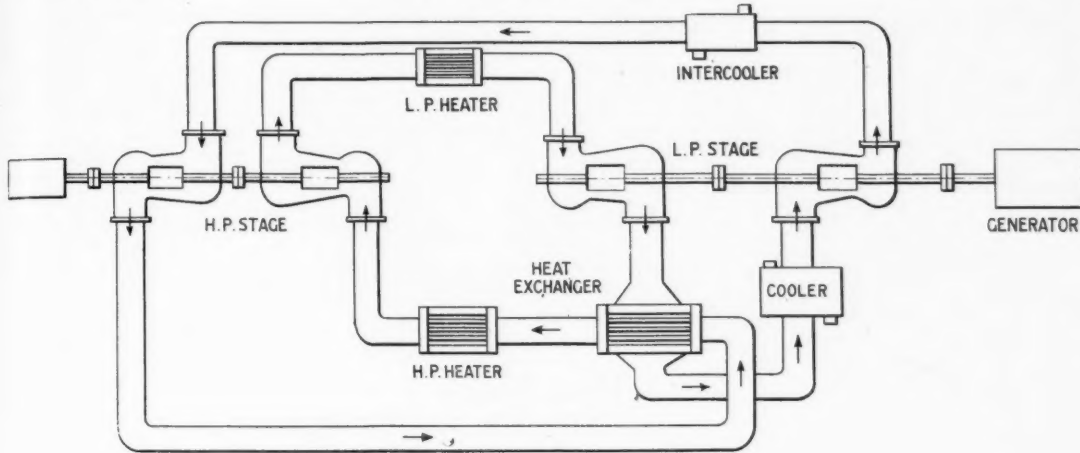


Fig. 1d—Closed-circuit gas turbine

combustion chamber then pass to the turbine (3), in which energy is extracted during expansion, and the gases finally are exhausted at atmospheric pressure. A large proportion of the shaft power of the turbine is required for driving the compressor, but the balance of power output is available for useful work.

Idealised Gas Turbine Cycle

If the compression and expansion could be carried out in a strictly isentropic manner, the thermal efficiency of the cycle would be independent of the combustion temperature, and would depend only on the pressure ratio, in much the same way as in the Otto cycle for piston engines the "air standard efficiency" is a function of volume ratio of compression. Pressure-volume (p, v) and temperature-entropy

the line da . The difference, *i.e.*, the enclosed area, represents the heat converted into useful work per lb. of air. It is assumed in the ideal cycle that the working substance consists only of air.

In practice it is impossible to achieve strictly adiabatic compression and expansion. In any real air compressor, for instance, the temperature rise will be greater than the corresponding adiabatic temperature rise for the same ratio of compression. The adiabatic

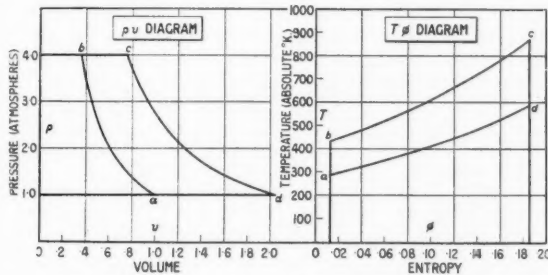


Fig. 2—Pressure-volume and temperature-entropy diagrams for the idealised cycle

(T, ϕ) diagrams* for this idealised gas turbine cycle are illustrated in Fig. 2. The line ab represents the process of compression; bc heating at constant pressure; cd expansion through the turbine; and da heat rejection in the exhaust at atmospheric pressure. Areas on the T, ϕ diagram represent heat quantities. The heat taken in per lb. of air is given by the area under the line bc , and the heat rejected in the exhaust is given by the area under

* The entropy of a substance is defined as the quantity measured by the $\int \frac{dQ}{T}$ during a reversible process, where Q is the quantity of heat taken in by the substance and T is the absolute temperature. An arbitrary datum level has to be chosen, and this usually is taken so that the entropy is zero at 0°C . (273°K .), and standard atmospheric pressure (*i.e.*, 14.7 lb. per sq. in. approx.). In the diagrams accompanying this article the entropy is expressed relative to this zero level, and the values are per lb. of air or gas. It can be proved that entropy is a function of the state of a substance, *i.e.*, that at any particular pressure and temperature the entropy of the substance will have a fixed value.

efficiency of a compressor is equal to the ratio of the ideal adiabatic temperature rise to the actual temperature rise in the compressor:—

$$\eta_c = \frac{T_b - T_a}{T_b' - T_a} = \frac{\left(\frac{p_b}{p_a}\right)^{\frac{\gamma-1}{\gamma}} - 1}{\frac{T_b'}{T_a} - 1}$$

where T_a = atmospheric temperature
 T_b = temperature at end of ideal adiabatic compression
 T_b' = actual temperature at outlet from compressor
 p_a = atmospheric pressure
 p_b = pressure at outlet from compressor

The result of this departure from the ideal cycle can be shown clearly on the T, ϕ diagram. In Fig. 3 the real com-

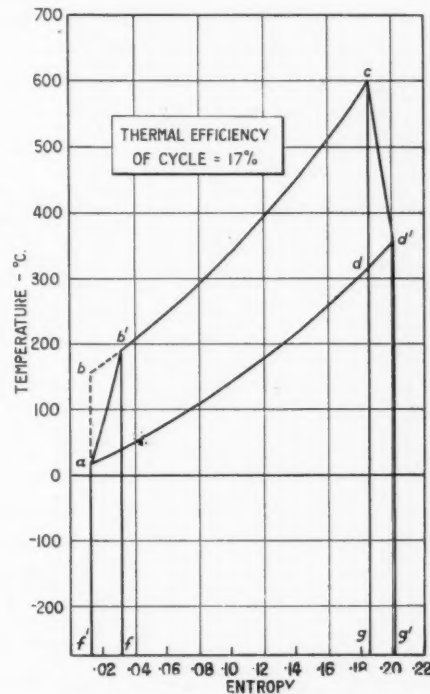


Fig. 3—Variation in practice from the ideal entropy diagram of Fig. 2

pression line is represented by the curve ab' instead of the isentropic ab .

Similarly, the expansion in the turbine will not be strictly isentropic. Heat is generated in an irreversible manner by friction during the passage of the gas through the turbine, and there is a progressive increase of entropy as indicated by the line cd' in Fig. 3. The heat generated by friction during compression and expansion is at the expense of the total head of the gas stream, and consequently represents a loss of energy available for conversion into useful work. Since the compression and expansion processes are not reversible in the thermodynamic sense, the net enclosed area on the T, ϕ diagram no longer represents the heat converted into work.

The heat supplied from the combustion chamber is now represented by the area $fb'cg$ under the constant-pressure curve $b'c$,

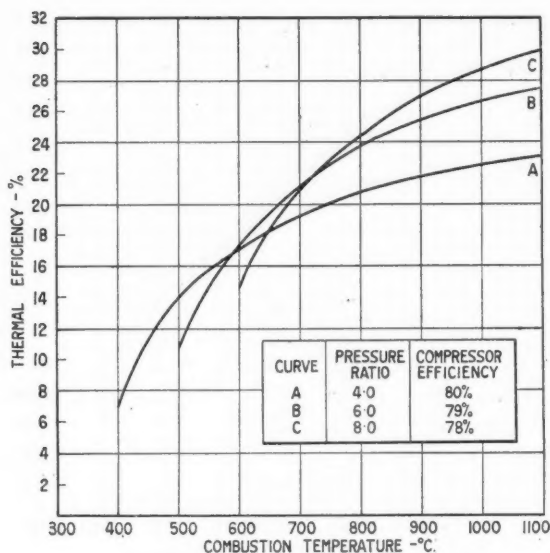


Fig. 4a—Showing the effect of combustion temperature on thermal efficiency

i.e., $C_p(T_c - T_b)$ per lb. of air. C_p is the mean specific heat at constant pressure of the air or mixture of gases. C_p increases with temperature. For rough calculations it is possible to take a mean value appropriate to the relevant range of temperature and also to the particular gas mixture involved. For accurate calculations, however, it is better to use the T, ϕ diagram. The slope of a constant pressure line at any point on the T, ϕ diagram is equal to $\frac{T}{C_p}$, and it is therefore possible to include the effect of variation of C_p with temperature when calculating the constant pressure lines.

Heat is supplied also to the air stream during compression and expansion, and the quantities are represented by the areas $fab'f$ and $gcd'g'$ under ab' and cd' respectively, but this heat is generated at the expense of the total head of the gas stream and is not supplied by the fuel. The heat rejected to the atmosphere is given by the area $g'da'f$ under $d'a$, i.e., $C_p(T_d' - T_a)$.

The thermal efficiency is, therefore, given by:—

$$1 - \frac{\text{heat rejected}}{\text{heat received}} = 1 - \frac{C_p(T_d' - T_a)}{C_p(T_c - T_b)}$$

A further small modification of this expression is necessary, however, to take account of the fact that the mass flow through the turbine is slightly greater than that through the compressor. The difference in mass flow represents the quantity of fuel burnt in the combustion chamber.

The heat converted into work per lb. of air is represented by the difference between the heat supplied and the heat rejected, that is, by the area $fb'cg$ minus the area $fad'g'$. The principal effect of non-adiabatic compression and expansion is to cause the combustion temperature T_c to have a profound effect on the thermal efficiency. It is apparent from the T, ϕ diagram that the greater the temperature T_c , the larger will be the enclosed area, and hence the proportion of work wasted will be smaller.

Compressor and Turbine Efficiencies

In order to see what thermal efficiencies are possible with the simple open-circuit turbine, it is necessary to make a few reasonable assumptions regarding the compressor and turbine efficiencies. In Fig. 4a thermal efficiency is plotted against combustion temperature for pressure ratios

of 4.0, 6.0, and 8.0 on the assumption that the adiabatic efficiency of the compressor is 80 per cent. for $\frac{p_b}{p_a} = 4.0$; 79 per cent.

for $\frac{p_b}{p_a} = 6.0$; and 78 per cent. for $\frac{p_b}{p_a} = 8.0$; these values corresponding to a constant polytropic or small-stage efficiency. For the turbine a small-stage efficiency of slightly over 83 per cent. has been assumed, which gives an efficiency ratio of 86 per cent. at pressure ratio 4.0. In Fig. 4b thermal efficiency is plotted against pressure ratio for various combustion temperatures.

In general, there will be an optimum pressure ratio for any fixed value of the combustion temperature T_c corresponding to maximum thermal efficiency. It is also evident from Fig. 4a that there is an envelope bounding the curves of thermal efficiency. This envelope represents the practical limit of thermal efficiency that can be attained with a simple open-circuit turbine. The exact position and shape of the envelope curve will depend on the compressor and turbine efficiencies, and their variation with pressure ratio. The

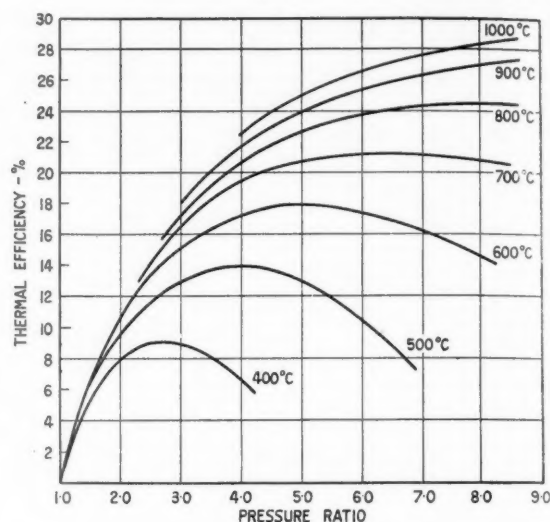


Fig. 4b—Effect of pressure ratio on thermal efficiency, shown at various combustion temperatures

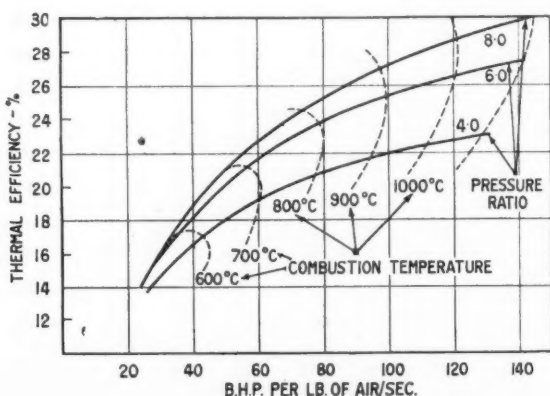
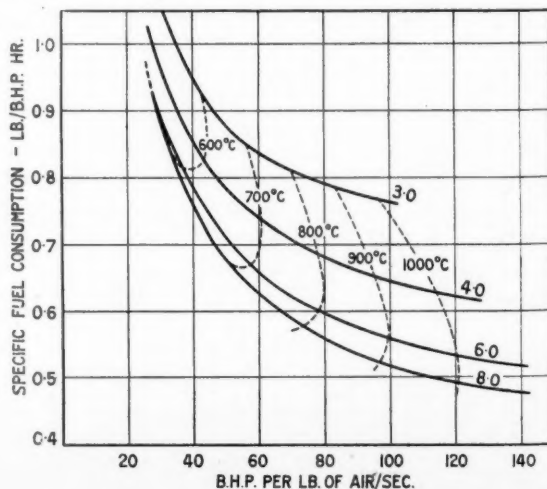


Fig. 5a (above) and 5b (right)—Performance curves of open-circuit turbine



overall thermal efficiency of a gas turbine is very sensitive indeed to compressor and turbine efficiency.

In Fig. 5a the curves of thermal efficiency, for pressure ratios of 4.0, 6.0, and 8.0, are plotted on a base of b.h.p. per lb. of air per sec. It must be stressed that these curves are of a general nature, based on the stated assumptions regarding compressor and turbine efficiencies. It is only when the exact characteristics of the compressor and turbine are known for a particular design that accurate performance curves can be computed. However, Fig. 5a gives a clear idea of the range of thermal efficiency available with the simple open-circuit turbine, and its dependence on pressure ratio and maximum permissible temperature at inlet to the turbine. In Fig. 5b curves similar to those of Fig. 5a are plotted with fuel consumption in place of thermal efficiency. A calorific value of 18,000 B.Th.U. per lb. of fuel oil (10,000 C.Th.U. per lb.) has been assumed.

For stationary turbines maximum temperatures are at present limited to about 600° to 650° C., depending on the material used for the turbine discs and blading. It is true that aircraft turbines are now operating with combustion temperatures of well over 800° C., but the working life of these machines is relatively short. With the application to stationary power or traction turbines of some of the special heat-resisting alloys developed for use in aircraft turbines, however, it should eventually be possible to push up working temperatures to 700° C. or even 750° C. without sacrificing reliability. It will be observed from Fig. 4b or Fig. 5a that with a combustion temperature of 700° C. an overall thermal efficiency of slightly over 21 per cent. should be attained.

Open-Circuit Turbine with Heat Exchanger

An obvious way of improving the thermal efficiency of the open-circuit turbine is to use some of the waste heat in the exhaust gases to pre-heat the air stream before entry to the combustion chamber. This is the arrangement illustrated in Fig. 1b. The temperature-entropy diagram for the cycle is shown in Fig. 6. From b' to h on the constant-pressure heating curve, heat is taken in by the air in passing through the heat exchanger. The remaining part of the curve, from h to c , represents the normal process of heating

in the combustion chamber. From d' to k on the constant-pressure cooling curve, heat is given up by the exhaust gases in passing through the heat exchanger. The remainder of the curve from k to a represents the normal process of heat rejection to the atmosphere. The shaded area under $b'h$ is the quantity of heat per lb. of air transferred to the air in the heat exchanger, and is equal to the shaded area under $d'k$, which represents the quantity of heat transferred from the exhaust gases.

The greatest gain in thermal efficiency would be achieved if the air could be pre-heated to the temperature of the turbine exhaust, so that $T_h = T_{d'}$. This would make full use of the available heat represented by the temperature difference $T_{d'} - T_b$. However, this obviously is not possible in practice, since there must be a temperature gradient across the heat exchanger at every point in order to maintain the flow of heat from the hot gases to the air. The greater the temperature gradient (or in other words, the greater the temperature difference $T_{d'} - T_h$) the smaller is the surface area of heat exchanger required for a given rate of heat transfer.

The heat available for transfer represented by the temperature difference $T_{d'} - T_b$ between the turbine exhaust and the air at outlet from the compressor, increases with increase of combustion temperature, but decreases with increase of pressure ratio. The possible gain in thermal efficiency by using a heat exchanger is, therefore, greatest at the lower pressure ratios and high combustion temperatures. In fact, for a very high pressure ratio T_b may be greater than $T_{d'}$, in which case there is no application for a heat exchanger at all.

Fig. 6 is drawn to scale for the same conditions as Fig. 3, that is, for a pressure

ratio of 4.0, combustion temperature 600° C., and the same compressor and turbine efficiencies as previously. The two $T\phi$ diagrams, therefore, provide a direct comparison of the open-circuit cycle with and without a heat exchanger. It is assumed that 50 per cent. of the heat theoretically available for transfer is actually exchanged, i.e., T_h is taken as 273° C. This represents a rise of temperature of the air of 84° C. by pre-heating in the heat

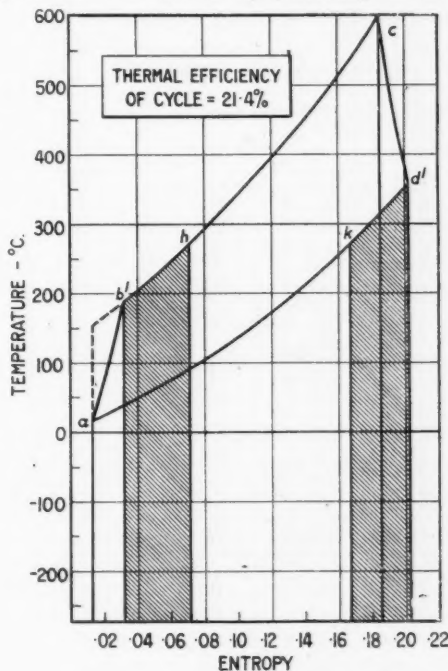


Fig. 6—Temperature-entropy diagram for working cycle of open-circuit turbine with heat exchanger

exchanger. The thermal efficiency of the cycle in this case should be 21.4 per cent. (compared with 17.0 per cent. without any heat exchange).

In Fig. 7 the thermal efficiency of an open-circuit turbine with heat exchanger is plotted, (a) against combustion temperature for various pressure ratios, and (b)

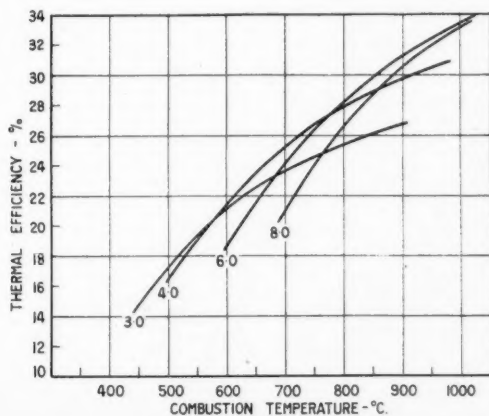


Fig. 7a—Thermal efficiency curves of open-circuit turbine with heat exchanger, at various pressure ratios

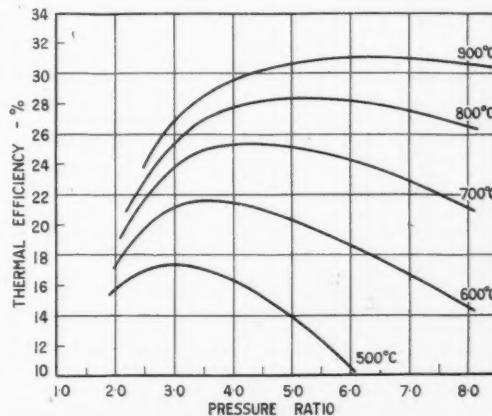


Fig. 7b—Thermal efficiency curves of open-circuit turbine with heat exchanger, at various combustion temperatures

against pressure ratio for various combustion temperatures, on the assumption that 50 per cent. of the heat theoretically available for transfer actually is exchanged in each case. Figs. 7a and 7b may be compared with Figs. 4a and 4b. It will be observed that the optimum pressure ratio for any given combustion temperature is lower than in the case without heat exchange. With a maximum permissible combustion temperature of 700° C., a thermal efficiency of about 25 per cent. should be possible.

Further Developments with Combustion Turbines

If a high pressure ratio is required, it is convenient to have two separate compression stages arranged in series (*i.e.*, two mechanically independent stages; each compressor will have several rows of blades or "small stages"). In this way the problem of starting is eased considerably. With a stationary turbine plant it would be natural to arrange an intercooler between the two compression stages, but this is not possible with a locomotive turbine. However, if the expansion is divided between two separate turbines, a second combustion chamber can be incorporated between the two turbine stages. A T, ϕ diagram for this arrangement is shown in Fig. 8.

If there is no heat exchanger, nothing will be gained in thermal efficiency by employing two separate combustion chambers and turbines. The work area of the diagram will, however, be slightly larger, and so there will be a small increase in the b.h.p. per lb. of air per sec. However, with a heat exchanger in the circuit the thermal efficiency will be higher for the two-stage arrangement, because the exhaust temperature is higher, and, therefore, the quantity of heat available for transfer is greater. The extent of the gain will depend on the size of the heat exchanger. In Fig. 8 the overall pressure ratio is 4.0, and with a maximum combustion temperature of 600° C., the thermal efficiency with 50 per cent. heat exchange is 22.0 per cent. With maximum combustion temperature 700° C., the thermal efficiency should be over 25 per cent. provided the same proportion of heat exchange is main-

tained. With higher proportions of heat exchange, correspondingly higher thermal efficiencies would be attained.

With the two-stage circuit it may be convenient to divide the expansion unequally between the turbines and take all the useful power from one machine. For instance, the h.p. turbine could be designed to operate through a smaller pressure ratio than the l.p. compressor, in such a manner that it would provide just enough power to drive the compressor, but without any surplus shaft power. The l.p. turbine would then operate through a greater pressure range and would develop all the useful power of the circuit. An alternative arrangement is to divide the expansion into three stages and have an entirely separate "power" turbine.

Effect of Atmospheric Temperature

All calculations so far have been based on an atmospheric temperature of 15° C. (59° F.). The power output and efficiency of a gas turbine increase with fall of temperature and decrease with rise of temperature. For this reason gas turbine locomotives will be better suited for operation in countries having a cold climate than in tropical regions.

In conclusion, it may be said that a thermal efficiency of about 24-25 per cent. is an immediate practical possibility for a gas turbine plant suitable for installation in a locomotive. The overall efficiency at the drawbar should, therefore, be about 20

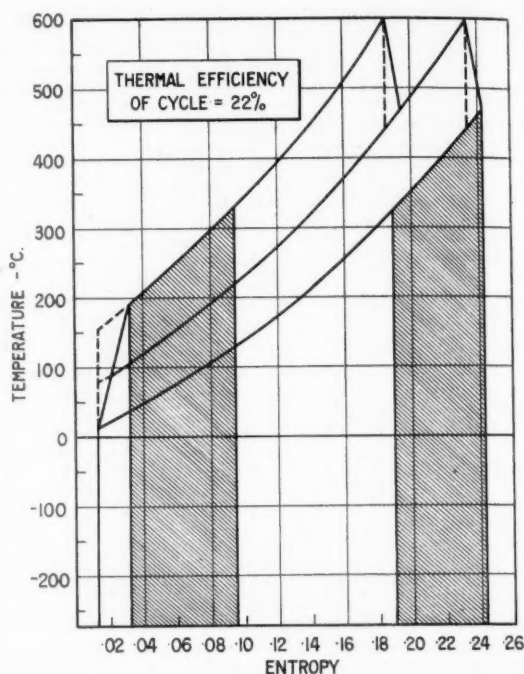


Fig. 8—Temperature-entropy diagram of two-stage turbine with separate combustion chambers and heat exchanger

per cent. This falls short of the 28-30 per cent. efficiency of the modern diesel-electric locomotive, but when account is taken of the fact that the fuel oil required for gas turbines is much cheaper than diesel fuel, and also that lubrication costs are less with the turbine, running costs actually should be lower for the gas turbine-electric locomotive. Everything will depend, however, on reaching a high degree of reliability without excessive maintenance. Availability in railway service is the vital matter if gas turbine traction is to become a serious rival to diesel traction.

SINO-FRENCH TALKS ON YUNNAN RAILWAY.—A Sino-French conference opened in Nanking on November 8 to work out the details of the agreement of February 28, 1946, regarding the Yunnan Railway and the free zone set up in Haiphong for the transit of Chinese goods.

ROAD HAULAGE AND HIRE CHARGES.—In view of changed conditions since the Road Haulage & Hire (Charges) Order was made in 1942, the Minister of Transport has made an amending Order. The Orders now provide that the charge made by any person for the carriage of goods on roads by motor goods vehicles or trailers, or for the hire of such vehicles, shall not exceed that which would have been fair and reasonable in July, 1939, with the addition of a percentage reflecting increases in costs since that month; and that, in any decision by the Minister, a Regional Transport Commissioner, or other person acting on the Minister's behalf, on an application for the revision of a charge, the appropriate percentage to be added shall, in the absence of proof to the contrary, be 55 per cent. The Order of 1942 provided that the charge made by any person for the carriage of goods on

roads by motor goods vehicles or trailers, or for the hire of such vehicles, should not exceed that which would have been fair and reasonable in October, 1940, with the addition of a percentage reflecting increases in costs since that month. The Order also provided that, on an application for the revision of a charge, any question whether the charge conformed with those conditions should be decided by the Minister, or a Regional Transport Commissioner, or other person acting on the Minister's behalf, who should have power to direct the substitution of another charge; and that in any decision on such an application the appropriate percentage to be added should, in the absence of proof to the contrary, be 7½ per cent. The amending Order substitutes July, 1939, for October, 1940, and substitutes 55 per cent. for 7½ per cent. The Ministry of Transport states that there is no question, however, of there being a fixed percentage to be added to pre-war charges in all cases. If a charge is not more than 55 per cent. above what was a fair and reasonable charge in July, 1939, any person wishing to challenge it has to prove that it is too high. If it is above

that figure the onus of proof lies on the person making the charge.

WIND TUNNEL TESTS ON MODEL OF THE SEVERN BRIDGE.—Scientists from the National Physical Laboratory are to carry out a special investigation for the Ministry of Transport into the effect of wind forces on a model of the proposed 3,000-ft. span suspension bridge over the River Severn. The tests will be made in a specially-designed wind tunnel, large enough to house a model 52 ft. long, in which will be observed the effect of a wind striking the bridge from any quarter. The tunnel, one of the largest in the country, is being built under the direction of the Ministry's engineers, and it is hoped to complete it in time for experiments to begin early next year. A research team headed by Dr. R. A. Frazer, F.R.S., will carry out the experiments, which have been arranged by the Department of Scientific & Industrial Research. The results will enable the bridge designers, Messrs. Mott, Hay, & Anderson and Messrs. Freeman, Fox & Partners, to choose the form of suspension bridge best suited to withstand any wind forces that may be experienced.

New Medium Milling Machines

The Cincinnati No. 2MI milling machine has a wide speed and feed range to meet all metal-working requirements

A NEW medium-size knee-and-column type milling machine, No. 2MI, incorporating many novel features, is in production by Cincinnati Milling Machines, Limited, Tyburn, Birmingham. These British-built machines are powered by 5-h.p. motors, and are made in plain and universal types. An exceptionally wide range of speed and feed ratios—60 to 1 and 120 to 1 respectively—covers the requirements of all types of milling operations in the metal-working industries.

The sixteen spindle speeds, ranging from 25 to 1,500 r.p.m., are changed by hydraulic mechanism controlled through a selector valve operated by a single crank. A

column, the motor and its mounting can be removed as one unit. This construction serves also as a convenient method of adjusting the tension of the V-belts. The main drive clutch is a single-disc dry plate unit, with accessible adjustment. A multiple-disc spring-loaded brake, operated by the disengaging action of the starting lever, stops the spindle instantly when the drive clutch is disengaged.

Lubrication of the No. 2MI milling machines has been given careful consideration to ensure long life and sustained accuracy. Parts within the column and knee are lubricated automatically from individual pump and cascade systems, with

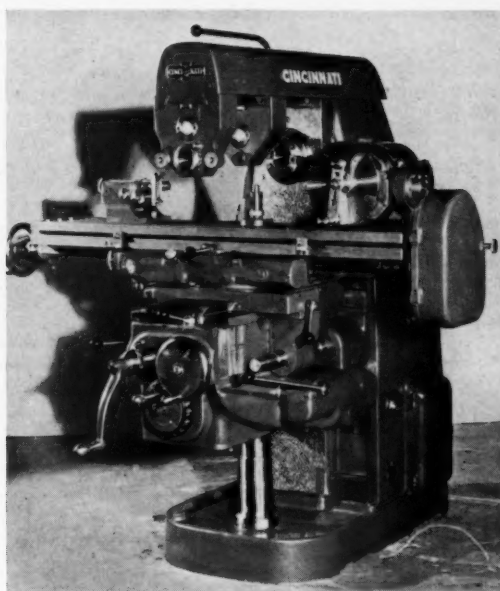
the starting lever, and the overarm pilot wheel have similar plastic knobs. Cross and vertical hand cranks are disengaged automatically when their respective power feed lever is engaged. This arrangement constitutes an important safety feature, as it prevents the hand control from spinning during the feed of rapid traverse movement.

Micrometer dials for the manual adjustment controls are very large, and the graduations are deeply cut for clear visibility. To reset the dials, they are merely pulled out against a light spring pressure, and rotated to the desired setting.

"Live" rapid traverse, at the rate of 150 in. per min. longitudinal and cross, and 75 in. per min. vertical, may be engaged through a level control at the side of the knee. This is a time-saving feature when the machine is used for production work. The starting lever may be adjusted



Plain milling machine



Universal milling machine

half-turn of the crank, to right or left, rotates a dial marked with spindle speeds in $\frac{1}{8}$ -in. black-on-white numerals, and engages the appropriate gears. A safety lock prevents the change-speed crank being moved while the spindle is rotating. Mechanical spindle reverse is effected by a control located just below the change-speed crank. It has no effect whatever on the direction of feed.

The 16 feed rates, from $\frac{1}{4}$ in. to 30 in. per min., are selected in the same manner as the speeds, by half-turns of a single crank-type control, located conveniently at the front of the knee.

The spindle of horizontal machines runs on three precision bearings—tapered rollers at the front and centre, and ball bearings at the rear. The rear bearing is not constrained endwise, to allow for changes in length of the spindle caused by heat and the pull of the draw-in bolt. Extra metal on the bull gear produces a flywheel effect, a desirable quality when using sintered carbide cutters, single-tooth cutters, or end mills having widely spaced teeth.

Electrical maintenance is facilitated by the new type of motor mounting. By removing four bolts at the rear of the

tubing carrying oil to remote bearings. The pump in the column also supplies oil under pressure to the hydraulic gear-shift mechanism. A tubular strainer in the pump intake is readily removed from outside the column for cleaning. The vertical feed screw has its own lubricating system. A reservoir within the column is connected by a tube to the bottom of the pedestal for the vertical screw. The upper part of the pedestal is threaded, constituting the nut, and the remainder of the pedestal bore acts as a reservoir. Thus the vertical screw runs in a bath of oil, displacing and admitting its own volume through the tube to and from the reservoir, as the knee is traversed up and down.

Table ways and parts within the saddle and housing are lubricated by a manual pressure system built into the saddle. Arbor support bearings are lubricated automatically by gravity from self-contained dust-tight reservoirs. All reservoirs have individual glass level gauges. Feed controls are independent of each other, and each feed lever has a forward, neutral and reverse position. All are equipped with plastic knobs for convenience of the operator. Knee and saddle clamping levers,

to any position desired by the operator by means of a conventional straight tooth clutch, cut into the end of the starting lever, which engages a similar clutch on the vertical starting shaft extending out of the column.

Like the overarms for other Cincinnati milling machines, this unit in the present type is a rectangular casting, fitted in dovetail ways at the top of the column. It incorporates a built-in vibration damper, reducing the need for the arbor support brace except in the most unfavourable cutting conditions. The arbor support brace consists of a single vertical section bolted to the arbor support, its lower end being a bridge section clamped to the top of the knee. The brace may be reversed, as desired by the operator, presenting the vertical section to the right or left of the knee.

Electrical controls are built in for protection against dust, coolant and damage. Equipment for voltages higher than 220 includes a transformer which safeguards the operator by reducing the voltage to 110 at the push-button station. Another safety feature is the contact button at the rear of the column, in the door-closing surface. If the operator forgets to switch off the current before opening the motor com-

partment door, the button breaks the circuit automatically, immediately stopping the motor. Start-stop push-buttons are built into the column, on the left-hand side.

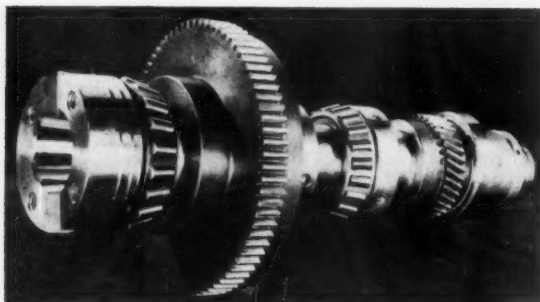
A novel coolant system provides complete enclosure of the centrifugal pump,

bracket on the right-hand side of the knee. It is then directed to the annual space between the inner and outer sets of telescopic tubes around the vertical screw pedestal, whence it returns to the reservoir in the base.

The main drive clutch, brake, and all

thereby increasing rigidity. A wiper recessed into the top edge of this apron keeps the face of the column clean and prevents scoring.

All rotating shafts are enclosed completely to protect the operator. In addition, the cross screw also is covered, and is



Above—Spindle of 2MI milling machine, with tapered roller bearings at front and centre and ball bearings at the rear. The large bull gear provides a flywheel effect

Right—Enclosed motor drive, with safety switch to break circuit when door is open



drive shaft, and the greater portion of the coolant supply piping, all of which is recessed into the front right-hand corner of the machine column. When necessary for servicing, the pump and its drive shaft may be exposed by removing a long, narrow cover which blends into the wall of the column. The coolant returns through cored holes in the table and saddle to the

spindle-drive gearing up to the back gear shaft are contained in a unit bolted to the rear wall of the column. The feed-drive gears, similarly, are contained in a unit bolted to the under-side of the knee. This type of construction facilitates maintenance. The apron on the knee, extending above its top surface, adds to the length of bearing on the face of the column,

protected against the wear from dust and chips by sliding covers on the right-hand side of the knee. Many attachments are available, particularly for horizontal machines. These include circular milling tables, several types of vertical and universal spindle attachments, motorised over-arm, and manual controls at the rear operating position.

Opening of Central Line Eastern Extension, London Transport



THE first section, from Liverpool Street to Stratford, of the eastern extension of the Central Line of London Transport to Loughton and Ongar will be opened by the Minister of Transport on December 3. It is four and a quarter miles long and has intermediate stations at Bethnal Green and Mile End. The former is a new deep-level station and the latter is the reconstructed District Line station, where the platforms have been converted

into islands, the outer faces of which will be served by Central Line trains, thus providing easy interchange with the District Line.

Bethnal Green Station has been built as a prototype underground station of the future. It has three escalators, a booking hall tiled in cream, grey, and brown, and two 420-ft. platforms. Fluorescent lighting has been installed, and the platform colour scheme is flame-red and black tiles

on a cream tile background. Beyond Mile End the tube dips below the Lea Valley and tunnels through marshy ground which has been hardened by a soil-solidifying liquid pumped into the river bed. At Stratford it rises to the surface to give platform interchange with L.N.E.R. lines now in course of electrification to Shenfield.

The tubes on the new extension are being soundproofed and the rails have been laid in 300-ft. lengths. The virtual elimination of noise and vibration and the pleasing design of the stations should render travel over the new line most attractive.

Date of Opening

The extensions from Stratford to Loughton and Hainault are scheduled to be opened by the end of next year. From December 4, when the line to Stratford will be open to the public, 456 trains will be run daily and a four-min. service will be provided at peak hours and a five-min. service at other times. The journey times will be 9 min. from Stratford to Liverpool Street and 20 min. from Stratford to Oxford Circus. Some through bookings from L.N.E.R. suburban stations to London Transport stations will also be instituted.

The whole scheme, including the western extension of the Central Line to Greenford and Ruislip which is now in progress, is described and illustrated fully in *Improving London's Transport*, published by *The Railway Gazette*, price 5s.

RAILWAY NEWS SECTION

PERSONAL

Mr. Robert George de Quetteville has been elected a Director of the Vulcan Foundry Limited.

Mr. Norman Stocks, General Manager, Paraguay Central Railway, who, as recorded in our November 1 issue, has resigned his position for reasons of ill-health, but is taking up residence in Buenos Aires as a Local Director of the company, was born in 1900, and was educated at Christ Church Higher Grade School, Southport. After a brief period with the Lancashire & Yorkshire Railway, in its Southport Goods Office, he entered the Merchant Service as Assistant Purser.



Mr. Norman Stocks

General Manager, Paraguay Central Railway, 1944-46; appointed a Local Director

with the exception of the recent war period, when he served for eighteen months with the Admiralty and 3½ years in various parts of the world with the British Overseas Airways Corporation. Mr. W. L. G. Butt, who has held several administrative posts, including those of Station Manager, Southampton, and Station Manager, Guernsey, since joining Channel Islands Airways in 1935, succeeds Mr. Wieland as Traffic Manager.

Mr. James C. Jones, M.I.Loco.E., Chief Mechanical Engineer, Paraguay Central Railway, who, as recorded in our November 15 issue, has been appointed General Manager, was born in Rosario de Santa Fé, Argentina, on December 6, 1888.

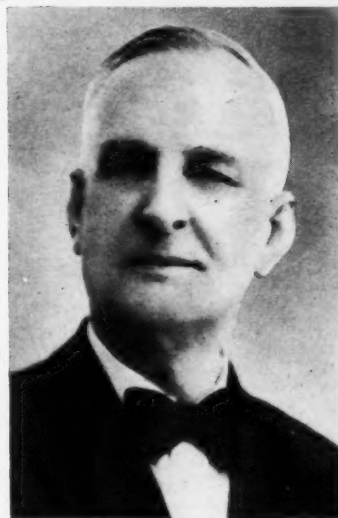


Mr. J. C. Jones

Appointed General Manager, Paraguay Central Railway

Goods Manager in 1933, for many years in the Goods Manager's Department, specialising in railhead storage and development and pooling matters. He became Assistant London City Manager in 1938, which position he now leaves to take up his appointment at Peterborough.

Mr. Charles J. Miller, Traffic Manager, Paraguay Central Railway, who, as recorded in our November 15 issue, has been appointed Assistant General Manager in addition to his duties as Traffic Manager, was born in the city of Parana, Argentina, in 1888, and entered the workshops of the Entre Rios Railways at the age of 15, as an apprentice. Five years later he joined the Mechanical Depart-



Mr. C. J. Miller

Traffic Manager, Paraguay Central Railway, appointed also Assistant General Manager

Mr. Stocks afterwards served in the South Wales Borderers, and on demobilisation, in 1920, he continued accountancy and other studies in Liverpool. In April, 1921, he joined the Paraguay Central Railway as Assistant Secretary to the General Manager, in Asunción, and shortly afterwards was promoted to be General Secretary. After having been Acting Traffic Manager, Acting Chief Accountant and Acting General Manager, successively, Mr. Stocks in 1940 was made Chief Accountant, continuing to assist the General Manager; and in 1944 he was appointed General Manager.

Mr. William Riley has been appointed European Accountant, Canadian Pacific Railway, in succession to the late Mr. T. H. Harris. Mr. Riley has been Chief Assistant to the European Accountant since June, 1943.

Mr. Robert A. R. Wieland has been appointed to an executive post with the English Division, British European Airways Corporation, and relinquished on November 21 his position as Traffic Manager of Channel Islands Airways Limited. Mr. Wieland has been associated with the development of air lines between Jersey and Guernsey and London and Southampton since January, 1934,

His apprenticeship years were spent in the workshops of the Nitrate Railways at Iquique, Chile, and with Kitson & Company, Leeds. He returned to the Nitrate Railways as draughtsman, and later was promoted District Locomotive Running Superintendent. Mr. Jones resigned from the Nitrate Railways to join Grace Brothers, of London, as Fuel Expert, covering the South American field, and, on expiry of his agreement, went to the Galena Signal Oil Company as Lubrication Service Engineer, serving for fifteen years in Brazil and Argentina. He then became Manager, Lubricating Division, West India Oil Company, Buenos Aires, and, after filling that post for ten years, retired to go into private business representing a number of important British and American engineering firms. Shortly after the outbreak of the recent war Mr. Jones joined the Paraguay Central Railway as Assistant Chief Mechanical Engineer, becoming Chief Mechanical Engineer three years later, which post he has relinquished after twelve months to take up his appointment as General Manager.

Mr. A. G. Croxall, who, as recorded in our November 8 issue, has been appointed District Goods & Passenger Manager, Peterborough, L.N.E.R., was, until his appointment as Assistant to the

ment, Central Argentine Railway. He transferred to the Running Department, Buenos Ayres & Pacific Railway, one year later, and in 1910 went to the joint Running and Mechanical Departments, Mendoza District. In 1911 Mr. Miller joined the Mechanical Department, Cordoba Central Railway, passing shortly afterwards to the Running Department; and he remained with that railway until 1918. In that year he commenced his service with the Paraguay Central Railway, as Running Inspector, in which post he continued until 1922, during which period he frequently relieved the Chief Mechanical Engineer. In 1922 he was appointed Chief of the Movement Office, and on several occasions was called on to act for the then Chief of Exploitation. In 1930 Mr. Miller was appointed Traffic Manager, and in recent years has relieved the General Manager.

Mr. F. S. Mitman has resigned his position as Managing Director of the Brush Electrical Engineering Co. Ltd., and Mr. Alan P. Good has been appointed Managing Director.

Mr. Harry Towers has been elected to the board of A. Reyrolle & Co. Ltd., of which he has also been appointed General Manager. Mr. Towers will assume his

new duties on January 1 next, from which date his resignation from Edmundsons Electricity Corporation Limited will become effective.

Mr. L. H. Pitcher has been appointed Goods Agent at Stratford Market, L.N.E.R.

Mr. S. G. Hearn, M.Inst.T., Principal Assistant to Superintendent of the Line, Paddington, Great Western Railway, who, as recorded in our November 8 issue, has been appointed Assistant Superintendent of the Line, Paddington, entered the company's service at Plymouth in 1911. Apart from four years with the Royal Engineers (Signals) during the war of 1914-18 in France, Belgium and Germany, he was employed at various stations in the Ply-

Manager of the Midland Bank. Mr. W. G. Edington and Mr. H. L. Rouse, hitherto Joint General Managers, have been appointed Chief General Managers; Mr. Rouse, who for some years has been in charge of administration, will continue to give special attention to such matters.

Mr. Anthony Bull, O.B.E., who has been appointed Acting Chief Staff & Welfare Officer, L.P.T.B., is 38 years of age, and entered the service of the Underground companies in 1929. After working in the Staff Department, the Publicity Office, the Offices of the Chairman and of the Public Relations Officer, he became Secretary to the late Mr. Frank Pick, Vice-Chairman of the L.P.T.B., in 1936. On the outbreak of war he was commissioned in the Royal Engineers and

served at Woolwich Arsenal, and from 1916-19 he was attached to the British Expeditionary Force in France, where he attained the rank of Lt.-Colonel, R.E. On demobilisation he was appointed Assistant Works Manager, Locomotive Works, Darlington, and in 1921 became Works Manager in charge of the Locomotive Works, Gateshead. On the amalgamation in 1923 Mr. Carr was appointed Carriage & Wagon Works Manager, York, and in 1927 proceeded to Darlington as Locomotive Works Manager. He went to Gorton Locomotive Works as Works Manager in 1933. He subsequently acted as Assistant Mechanical Engineer, Stratford, and later was confirmed in that position. In July, 1938, he was appointed Mechanical Engineer, Stratford.



Mr. S. G. Hearn

Appointed Assistant Superintendent of the Line, Paddington, G.W.R.



Mr. Anthony Bull

Appointed Acting Chief Staff & Welfare Officer, L.P.T.B.



The late Mr. F. W. Carr

Mechanical Engineer, Stratford, L.N.E.R., 1938-46

mouth Division until 1921. In that year Mr. Hearn was selected for the company's special training scheme, and was the first Traffic Department clerk to be so chosen. He received facilities for obtaining additional experience in the Goods, Traffic, and Docks Departments. After his training period, Mr. Hearn served for three years on the personal staff of the General Manager. In 1928 he took up special duties in the Office of the Superintendent of the Line, where he remained until his appointment as Junior Assistant to the Divisional Superintendent at Newport in 1930. He was transferred to the Worcester Division as Chief Clerk to the Divisional Superintendent in 1933, and in 1936 was made Assistant Divisional Superintendent at Newport. In December, 1938, he became Divisional Superintendent, Gloucester, and in April, 1940, Assistant to the Superintendent of the Line, Paddington. He was appointed Operating Assistant to Superintendent of the Line, Paddington, in February, 1941, and Principal Assistant in June, 1945. Mr. Hearn is a Member of Council of the Institute of Transport.

Field-Marshal Viscount Alanbrooke has been elected to the boards of the Midland Bank Limited and Midland Bank Executor & Trustee Co. Ltd. Acting on medical advice, Mr. G. P. A. Lederer has retired from the office of Chief General

appointed to the Transportation Directorate, War Office. Mr. Bull served throughout the war in the Transportation Branch, R.E. In 1942, as a Lt.-Colonel, he went to Central Africa to assist in the preparation of a new line of communication across Africa from the west coast to the Middle East and to the East Africa Command; for his work in that connection he was made an O.B.E. Subsequently he served in G.H.Q. Middle East, and on Lord Louis Mountbatten's staff in India and later Ceylon. For his services in South East Asia he was awarded the Bronze Medal by the U.S.A. Government. He was promoted Colonel early in 1944. At the request of the War Office his demobilisation, due in 1945, was deferred, as his services were required in Berlin in the Transport Division on the Control Commission for Germany. Mr. Bull, who was appointed an Officer of the Board, in his absence, in January, 1944, returned to the L.P.T.B. to take up his new duties on November 11 last.

Mr. Frank William Carr, whose death we recorded last week, had been Mechanical Engineer, Stratford, L.N.E.R., since July, 1938. He was born at York, and entered N.E.R. service in 1896. In 1910 he was appointed Motor Vehicle Superintendent. During 1915-16 he held an appointment under the Ministry of Muni-

Mr. W. H. Sharp has been appointed Assistant Managing Director of Thomas Smith & Sons (Rodley) Ltd., and Mr. Frederick Johnson has become a Local Director of that company.

INSTITUTION OF CIVIL ENGINEERS

The Council of the Institution of Civil Engineers for 1946-47 is composed as follows:—

President: Sir William Halcrow.
Vice-Presidents: Sir Frederick Cook, Sir Reginald Stradling, Sir Jonathan Davidson, Sir Roger Hetherington.

Other Members of Council: Mr. H. E. Aldington, Sir Stanley Angwin, Messrs. D. B. Brow (India), W. S. Cameron, F. M. Corkill (New Zealand), Dr. W. H. Glanville, Messrs. Alexander Gray (Canada), G. L. Groves, Herbert Hamer, Dr. E. J. Hamlin (South Africa), Messrs. A. C. Hartley, G. H. Humphreys, Leopold Leighton, M. G. J. McHaffie, M. S. Moore (Australia), W. H. Morgan, Dr. H. J. Nichols (India), Mr. C. M. Norrie, Sir Leonard Pearce, Professor A. J. S. Pippard, Messrs. V. A. M. Robertson, W. P. Shepherd-Barron, W. K. Wallace, D. M. Watson, Sir Arthur Whitaker.

Past-Presidents: Sir John Thornycroft, Dr. David Anderson, Mr. F. E. Wentworth-Sheilds, Sir Peirson Frank.

Secretary: Mr. E. Graham Clark.

Government's Compensation Proposals for Railway Stockholders

Statement by Mr. Alfred Barnes on the basis of calculating security values for the Transport Nationalisation Bill

In the House of Commons on Monday night, Mr. Alfred Barnes, Minister of Transport, stated that among the inland transport services to be acquired and brought under national ownership were all the activities conducted by the railway companies, the canal companies or boards, and the London Passenger Transport Board, whose undertakings had been and remained subject to control under Defence Regulation 69.

BASIS OF CALCULATION

The Bill shortly to be presented to Parliament would propose that the compensation payable for these undertakings should be based on the average mean daily quotations of their securities in the London Stock Exchange Official Daily List, for November 1, 4, 5, 6, 7 and 8, 1946; if, however, in the case of any such securities the pre-election prices, by which the Minister meant the average of the mid-monthly mean quotations for February to July, 1945, were higher, then the pre-election prices should be taken. He was circulating with the official report a statement of the values calculated on this basis, which would appear in the Bill. In the case of railway and canal securities, which were not quoted on the six days in November, 1946, the compensation would be settled by arbitration if need be, having regard to comparable securities for which a price would be fixed in the Bill.

GOVERNMENT GUARANTEED STOCK

For each £100 (nominal) of railway and canal stock of each description, the holder would receive such an amount of stock guaranteed by the Government as was, in the opinion of the Treasury, equal in value at the date of issue to the amount he had mentioned, regard being had to the market value of Government securities at the date of issue.

The Minister said he was making this statement in advance of the introduction of the Bill in order to put an end to uncertainty in regard to this matter. The following is the list of security values circulated with the statement:—

Security	Value of security (£100 nominal)
<i>The Southern Railway Company</i>	
4 per cent. debenture stock ...	£ s. d. 128 3 9
5 per cent. debenture stock ...	139 10 0
4 per cent. redeemable debenture stock (1962-67) ...	113 10 0
4 per cent. redeemable debenture stock (1970-80) ...	115 3 9
5 per cent. guaranteed preference stock ...	137 0 0
5 per cent. redeemable guaranteed preference stock (1957) ...	115 7 6
5 per cent. preference stock ...	124 8 9
5 per cent. redeemable preference stock (1964) ...	115 7 6
Preferred ordinary stock ...	77 12 6
Deferred ordinary stock ...	24 0 0
<i>The Great Western Railway Company</i>	
2½ per cent. debenture stock ...	95 10 0
4 per cent. debenture stock ...	128 3 9
4½ per cent. debenture stock ...	128 13 9
4½ per cent. debenture stock ...	130 7 6
5 per cent. debenture stock ...	142 7 6
5 per cent. rent charge stock ...	139 13 9
5 per cent. consolidated guaranteed stock ...	137 0 0
5 per cent. consolidated preference stock ...	125 3 9
5 per cent. redeemable preference stock (1950) ...	106 10 0
Consolidated ordinary stock ...	59 1 3
<i>The London Midland & Scottish Railway Company</i>	
4 per cent. debenture stock ...	118 13 9
5 per cent. redeemable debenture stock (1952) ...	108 17 6
4 per cent. guaranteed stock ...	107 18 9
4 per cent. preference stock ...	85 8 9
5 per cent. redeemable preference stock (1955) ...	105 10 0
4 per cent. preference stock (1923) ...	62 15 0
Ordinary stock ...	29 10 0
<i>The London & North Eastern Railway Company</i>	
3 per cent. debenture stock ...	103 5 0
4 per cent. debenture stock ...	118 7 6
4½ per cent. sinking fund debenture stock ...	107 10 0
4 per cent. first guaranteed stock ...	106 17 6
4 per cent. second guaranteed stock ...	100 15 0
4 per cent. first preference stock ...	58 5 0
5 per cent. redeemable preference stock (1955) ...	103 13 9
4 per cent. second preference stock ...	29 5 0
5 per cent. preferred ordinary stock ...	7 6 3
Deferred ordinary stock ...	3 12 6
<i>The London Passenger Transport Board</i>	
London Transport 4½ per cent. "A" stock (1985-2023) ...	133 3 9
London Transport 5 per cent. "A" stock (1985-2023) ...	142 3 9
London Transport 3 per cent. guaranteed stock (1967-1972) ...	107 17 6
London Transport 5 per cent. "B" Stock (1965-2023) ...	128 3 9
London Transport "C" Stock (1956 or thereafter) ...	67 3 9
<i>The Great Central & Midland Joint Committee (Lessors)</i>	
Great Central & Midland 3½ per cent. guaranteed stock ...	101 10 0
<i>The Great Western & Great Central Railways Joint Committee (Lessors)</i>	
Great Western & Great Central 3½ per cent. guaranteed stock ...	102 10 0
<i>The Midland & Great Northern Railways Joint Committee</i>	
3 per cent. Midland & Great Northern Joint Line rent charge stock ...	88 0 0
<i>The Whitechapel & Bow Railway Company</i>	
4 per cent. debenture stock ...	112 10 0
<i>The Birkenhead Railway Company</i>	
4½ per cent. perpetual preference stock ...	124 10 0
4 per cent. consolidated stock ...	112 3 9
<i>The Shrewsbury & Hereford Railway Company</i>	
6 per cent. rent charge stock ...	159 10 0
<i>The West Cornwall Railway Company</i>	
4½ per cent. Great Western, Bristol & Exeter, and South Devon Joint Rent charge stock ...	115 10 0
<i>The Forth Bridge Railway Company</i>	
4 per cent. debenture stock ...	109 0 0
4 per cent. guaranteed stock ...	104 17 6
<i>The Mersey Railway Company</i>	
4 per cent. new first perpetual debenture stock ...	116 15 0
4 per cent. perpetual debenture stock (Act 1866) ...	116 12 6
3 per cent. perpetual debenture stock (Act 1871) ...	97 0 0
3 per cent. perpetual debenture stock (Acts 1882-3-5) ...	97 0 0
3 per cent. perpetual "B" debenture stock ...	97 0 0
3 per cent. perpetual preference stock ...	76 0 0
Consolidated ordinary stock ...	36 7 6
<i>The Sheffield & South Yorkshire Navigation Company</i>	
4½ per cent. preference stock ...	2 0 0
<i>The Company of Proprietors of the Birmingham Canal Navigations</i>	
Consolidated stock ...	103 15 0
<i>The Grand Union Canal Company</i>	
3 per cent. perpetual debenture stock ...	87 10 0
5½ per cent. perpetual debenture stock ...	111 17 6
4 per cent. Grand Union Canal development loan No. 1 debenture stock (redeemable 1953) ...	102 10 0
Capital (ordinary) stock ...	21 5 0
<i>The Leeds & Liverpool Canal Company</i>	
3½ per cent. debenture stock ...	79 10 0
Consolidated ordinary stock ...	13 8 9
<i>The Lee Conservancy Board</i>	
4 per cent. debenture stock ...	117 10 0
<i>The Sharpness Docks and Gloucester & Birmingham Navigation Company</i>	
4 per cent. debenture stock ...	96 10 0

NOTE: Nothing in this statement affects securities redeemed before January 1, 1948. Although parts of the undertakings of the Manchester Ship Canal Company and the Fishguard and Rosslare Railways & Harbours Company are subject to control, those undertakings are not within the scope of the proposals to which this statement relates, and consequently, the securities of those companies are not included in the statement.

L.N.E.R. Steamer "Arnhem" Launched at Glasgow



Sir Ronald Mathews, Chairman, London & North Eastern Railway Company, and Sir Charles Newton, Chief General Manager, at the launching of the L.N.E.R. steamship "Arnhem" at Glasgow on November 7

Lords and Commons Debate Transport Nationalisation

Lord Portal's arguments against State ownership

Viscount Cranborne (Leader of the Opposition), in the course of his speech in the House of Lords on November 12 on the motion for an address in reply to the King's Speech, said that the Opposition deeply deplored the proposal to nationalise inland transport. In its view, inland transport of all industries was the least susceptible to a rigid centralised control. In the view of the Opposition, to put inland transport into the strait-jacket of Government ownership must have the effect of destroying initiative and hampering efficiency. What made it so queer and so tragic was that the Government was doing it at the very moment when it was spurring on the people to further efforts, and paying lip service in its speeches to the principle of private profits and private ownership. He could see only one explanation of that strange paradox, and that was that the Government was in effect no longer quite master in its own house; it was the prisoner of its past. For years it had preached the evils of private enterprise and the importance of getting rid of the private employer. Now, when the Labour Party had come into power with a clear majority, its supporters, and in particular the trade unions, expected its promises to be redeemed.

Viscount Addison (Secretary of State for Dominion Affairs), who replied for the Government to the day's debate, pointed out that the present leader of the Conservative Party had proposed to nationalise the railways himself 20 years ago.

EFFICIENCY OF ROAD HAULAGE

Lord Sandhurst demanded, as a matter of right, that some attempt should be made to convince him that there would be greater efficiency under nationalisation. No one had ever suggested that road haulage was inefficient. It was not only the owners, but the vast majority of the drivers and others employed in road transport, who were most active against the nationalisation of their industry. The older men had seen the results of the nationalisation of other industries, and the younger men were looking to their own future. They realised that under nationalisation the chance of advancement went. They could not go to the other firm that wanted just the qualities they possessed, and get the job they wanted. They had to take their place in the queue, and be promoted when their time came. What the road haulage industry asked for was just that it should be proved that a nationalised transport was more efficient than a privately-controlled one. That could only be proved as a result of public inquiry. If the Government refused that inquiry, which was demanded throughout the country, there was only one possible conclusion to be drawn: that it dare not face it because it knew it could not prove its case.

Viscount Elibank said the nationalisation proposals filled him with great despondency and alarm. They could not nationalise the transport and electrical industries without dislocating other industries. Yet the Government came forward just at the moment, when it admitted that things were difficult, with these two great schemes of nationalisation which were going to make things even worse, in the process of changing, even if after they were changed things might be better in some directions. He hoped that before these two industries were finally nationalised the Government would look at the matter from the point of view of ascertaining the best method of changing over from private

enterprise to State nationalisation, so as to cause the least amount of dislocation to all those industries dependent on these two big industries, and so as to alleviate, at any rate to some extent, what many of them believed would produce very poor results.

LORD PORTAL'S VIEWS

Viscount Portal, in the course of his speech, in the resumed debate on November 13, said that the Road Haulage Association and the four main-line railway companies were asking for a public inquiry by an impartial tribunal before any such Bill was introduced. The reason was that, once the transport system of this country was nationalised, it would be impossible to change it, and it was fair, both to the public and the traders, that they should be satisfied that the change would be beneficial to the country. There were many important factors to be considered. Differences between road and rail had constituted one of the great difficulties in days gone by. After the war of 1914-18, when road competition became acute, the railways had begun to feel the handicap of their statutory obligations, which put them at a disadvantage with road transport, which had been uncontrolled until the passing of the Road Traffic Acts in 1930, 1933 and 1934. They had only partially dealt with the situation, but they did not make the road hauliers subject to the same statutory obligations as the railways. In January, 1945, for the first time, the National Road Transport Federation had been formed, and there they had the first body prepared and ready to negotiate on questions between road and rail. That body could speak with authority for all road haulage interests, and in May, 1945, fresh conversations had been initiated between the General Managers of the four main-line railways and the Road Haulage Association, representing the road hauliers' section of the Federation. Those conversations had had the support of the then Minister of War Transport, Lord Leathers, and had continued with the approval of the present Minister of Transport. As a result of those conversations a scheme was agreed on for the co-ordination of all road and rail freight transport services. Under that scheme, submitted to the Minister of Transport in July of this year, the road haulage industry, for the first time, largely accepted the obligations involved by a public service. The main points of the scheme were:—

First, the road hauliers, within the limits specified in their licences, undertook to provide reasonable, and, where appropriate, regular services; and to accept all traffic offered which was within their capacity to carry.

Secondly, area organisations were to be established to provide for the conveyance of goods by road which could not be handled conveniently by individual hauliers under the terms of their licence.

Thirdly, a Road-Rail Tribunal was to be established similar to the present Railway Rates Tribunal to settle standard conditions of carriage, classification of merchandise, and co-related road and rail rates schedules.

Fourthly, any representative body of users or providers of transport was entitled to be heard before the Road-Rail Tribunal on those matters, and any trader was free to apply to the Tribunal to vary the scheduled charges or any of them on the grounds that they were not reasonable.

Fifthly, observance of rates and condi-

tions of carriage were to be a statutory obligation on the railways and road hauliers.

Under that scheme the dangers of monopoly would be avoided, as traders would be entirely free to choose the form of transport most suitable to their business, including the right to carry their own goods in their own vehicles under "C" licenses. If a trader considered any rate to be unreasonable, he would have the right of appeal to the rates tribunal. There were other methods of organisation of road and rail co-ordination to ensure the most economical use of road transport. They included the organisation of railway collection and delivery and other road services on a co-operative basis to ensure the most economic use of transport. There was also the provision of railway wagons for the sole use of the road haulage industry on selected routes so as to provide express services for long-distance traffic. Further, there was the establishment of a transport advisory body, possibly assisted by local bodies, representing transport undertakings, traders, and organised labour, to advise the Minister of Transport on the development of transport facilities and still closer co-ordination of all forms of transport. The proposals in the new agreement provided for a large measure of co-ordination with a minimum of disturbance. The proposals left ample scope for enterprise on a fair and competitive basis and went far to eliminate the waste that was admitted to exist in any wholly-unregulated competition. While negotiations had been going on, all the various trading bodies interested had been taken into consultation.

He presumed that the Bill would not be produced from the point of view of the efficiency of the railways. Their preparedness and the work they had carried out for this country during the war under extreme difficulties had been recognised by all. The tribute paid to our railways by General Eisenhower and his staff, as well as by transport experts who came from America, was sufficient proof to him of the efficiency of our railways. He could himself pay tribute to the great work done because those were the only four years of the last 20 years that he was not there. The way that the men and the officers and everybody had carried on during those difficult days when the railways were being bombed night and day deserved the praise of all parties. He considered, therefore, that the railways had proved their efficiency on the operational side.

RECENT INQUIRY

Turning to the economic running of the railways, he said the best example he could give the House would be the Charges (Railway Control) Consultative Committee which had recently held an inquiry at the request of the Minister of Transport to advise him as to the best method of adjusting railway charges so as to produce in 1947 a net revenue approximating to the amount of rent payable by the Government to the railway companies under the control agreement. The figure, including the London Transport Board, was £42,000,000; and if they took the railways alone, it was just under £39,000,000 a year which had to be produced. When the end of the war had come he thought that the only advance made in railway charges was approximately 16½ per cent. on pre-war charges. The evidence and estimates given by the companies and supported at the inquiry on the basis of the existing wage levels and cost of materials indicated that if railway charges were increased to 37 per cent. over their pre-war level, the net revenue which the Minister required would

be forthcoming. He thought that was very important, that for an increase of 37 per cent, the same net revenue which stockholders were being paid under control would be forthcoming. He had been responsible to the Ministry of Supply for most of the controls in this country, and there were no other controls he knew of that could work at 37 per cent. over their pre-war figure. The average increase in railway costs—he took the figures from the Minister of Transport—was about 70 per cent. The main items of expenditure by the railways, namely, salaries and wages, coal, sleepers and rails—had all risen markedly. Salaries and wages had risen by 60 per cent. Coal had increased by 137 per cent. alone. The railways had had the privilege before the war, being the biggest users, or some of the biggest users, of coal, of buying it at a quite economical figure in large quantities. Sleepers had gone up by 204 per cent. and rails by 70 per cent. Therefore it could fairly be claimed that it was a tribute to the efficiency of the operation of the railways that under the present ownership and management they expected to be able to earn the additional revenue sought by the Minister from the relatively small increase in their charges to which he had referred.

They had been fortunate in having had no major disputes for 20 years on the railways, and that one attributed to the success of the conciliation machinery for settling questions of wages and conditions of service of the railway staff. As it functioned now, if the railway companies and their employees were unable to reach agreement, the matters at issue were referred to a National Wages Tribunal, which was an entirely independent body. But if the Minister, by virtue of his responsibility for the administration of transport, became party to proceedings before the tribunal and a decision of the tribunal was subsequently raised in Parliament, he might in certain circumstances be put in the position of becoming judge in his own cause and would often, he was afraid, be faced with political pressure. That was one of the greatest difficulties to be faced in the future with the nationalising of industry.

TEST OF EFFICIENCY

The test of any well-run business must surely be whether it could meet the requirements of its customers in an efficient and economic way. That was the objective which was uppermost in the minds of those who administered the affairs of the railway companies. The railways as statutory companies were subject to such regulation as Parliament might consider to be necessary in the national interest, and while it was their policy to have regard to national interest at all times, they had a special interest in fostering traffic within their own particular areas. They did all they could to encourage the establishment and development of businesses on their lines. When they remembered that there had been no fewer than 16 Ministers of Transport during the last 26 years one could hardly expect continuity of policy to be maintained. There were many who felt that the advantage of the nature of those to which he had referred would be lost if future policy should become centralised under the general direction of the Minister of Transport. The present system of administration of the railways with its flexibility in the fixation of rates, and the freedom to meet local and other conditions, had facilitated many industrial developments and in so doing helped to alleviate the depression which, not so long ago, had existed in the different parts of

the country. The amalgamation of the various railways into the present four main-line companies had taken place after 1921, and it had taken five or six years to accomplish. To carry out another far-reaching scheme, such as was now proposed, must take a long time. All the railways had their programmes ready to start, directly the material and labour were available. A change of that kind must mean a slowing-up of all those plans. Under the present system, decisions on policy and capital expenditure could be taken immediately. Would it be possible to get decisions taken as quickly, when in many cases they would have to be referred to a Government department and, probably, to the Treasury? It was not as if the results of nationalisation of transport in other countries could give the Government the necessary confidence to proceed without any public inquiry.

Lord Portal said his family had been associated with railways for 85 years. His grandfather had been Chairman of the South Western Railway, and his father had been Deputy-Chairman of the South Western Railway. He was now Chairman of the Great Western Railway. He was justly proud of the railways, and he asked the Government, before it did anything drastic, to be quite certain that it was making a move in the right direction.

LORD STRABOLGI'S REPLY

Lord Strabolgi said there had been a number of inquiries into the transport of the country. They had had an important Royal Commission on the railways, and more recently they had had two or three inquiries into the canals, and other inquiries into road transport. The data was all there; the facts were there; the case was well known. However wonderful the railways were as regarded the work done by their staffs and workmen under very difficult war conditions, the fact remained that in both wars it had been necessary that the railways should, in effect, be taken over by the State and completely controlled by the Minister of War Transport. The Governments which had taken that decision were not Labour Governments. The reason was perfectly simple. Without complete co-ordination of railway traffic and, to a certain extent, of road traffic, we could not get the maximum efficiency required in wartime. All they were asking was that the same reasoning should apply now. They wanted to obtain the maximum efficiency from our transport for the good of the nation in peacetime. If there was to be a monopoly of the transport industry, and that he believed was considered necessary for efficiency, it must be under public ownership and control. If the Government assumed public ownership and control of the railways, it would automatically acquire with the railways many other properties as well, such as docks, hotels, passenger steamers and all sorts of things. It would also acquire a very large holding in road transport. Could it be suggested that it would be a good policy for the Government to be in direct competition with the remaining private road hauliers? Because that was what would happen. That consideration alone made the case for taking over road transport with the railways unanswerable. He asked whether the scheme for bringing under public ownership and control the inland transport of this country would apply to coastal shipping, and whether it would apply to docks, because the railways owned a great many of the main docks and some shipping as well.

Referring to canals, he said that when they had had the opportunity the railways had bought up the canals and diverted the traffic to the railway lines, however uneconomical it might be. At the peak of their efficiency and prosperity the canals of this country had carried 40,000,000 tons of goods annually. In 1938 there had been only 13,000,000 tons carried, and it was dropping. He did not see how they could possibly expect a nation-wide reorganisation and rehabilitation of the canal system, which was admitted to be desirable, unless they had the same authority as that responsible for the other means of transport in the country.

There was no real competition with only four great railway companies. Apart from appealing to the Railway Rates Tribunal the ordinary private individual really had no redress. Nor did he think the railways could preen themselves on having been tremendously enterprising in developing the main transport systems of the country.

LORD BALFOUR OF BURLEIGH'S SPEECH

Lord Balfour of Burleigh denied that the railways had bought up and deliberately neglected the canals. The position was that in the days when the promoters had had to acquire land for the railways there had not been any easy methods for land acquisition. They had had to take land on the terms they could get, and often it had included canals which they did not want. Quite often they had had to undertake obligations to maintain those canals, and those obligations they had scrupulously carried out, even though canals had proved to be a burden on the railways. It was true that canals at the peak of their prosperity had carried a great amount of traffic, but they had been put out of business to a very large extent by a more efficient means of transport. Between the two wars the railways had spent something like £450,000,000 on modernising and improving their tracks. Traders had never had more beneficial competition than that between the railways and road transport.

The problem with which they had to deal was, in its essence, how to co-ordinate road and rail. The problem there was the existence of the two different rate structures of the different industries. Because the railways had had a monopoly Parliament had imposed on them the tremendous system of classification and rating. Quite briefly, the system was that the traffic should be carried for the rates which it could bear. The railways always had had not only to be ready to carry goods, however difficult, or inconvenient, or unremunerative. They served areas which in themselves were not densely populated, and which by themselves would not have been remunerative. The system had worked all right so long as the monopoly lasted, but then there had arisen the great road industry based on a system where traffic was carried at rates based on cost. The road industry could compete with the railways in the higher classification with the most deadly effect. It could take the cream of the traffic. Obviously in the higher classifications of goods, where the value was high in relation to bulk, the railway rates were higher and road rates were lower. In the low classifications, such as minerals, coal, and raw materials, the railways were left with the less remunerative traffic, because it was not suited to the roads. But the carriage of those raw materials at low rates was

essential to the national economy and to the national interests. In consequence, of the two alternatives which lay before the railways—if they were to pay their way under conditions of open competition with the roads—they could adopt only one. One alternative was to raise the rates of the low classifications, which would be against the national economy. The other was that they must be assured of a reasonable share of the higher classification traffic. The Act of 1921, which had settled railway matters after the war of 1914-18, had been out of date before ever it had been on the Statute Book. The great road transport industry had arisen, and it was not fully realised what it would mean to the railways. Nevertheless, in the 25 years since 1921—the railways actually had been amalgamated on a date in 1923—there had been created four homogenous great main-line companies. Those entities were big enough already, if not too big. The number of employees of the L.M.S.R. was 245,000. On the L.N.E.R. the number was very nearly 200,000. He believed he was right in saying that those figures were larger than those of any single American railway company. Any step of wider merger was fraught with the greatest danger of incompetence and loss of efficiency.

The road transport industry, which was also to be nationalised, consisted at the moment of 60,000 independent hauliers. They had an average, he believed, of something between two and three lorries apiece. It was impossible to convince him that incentive to efficient service would not be removed from those thousands of men once this wicked, much-maligned motive of profit no longer existed. What was wanted for the road transport industry was not nationalisation but rationalisation, and that was a thing they had never been allowed to have. Today they had the opportunity to get rationalisation. What he meant by that was, first, closer co-ordination with the roads; secondly, elimination of overlapping and duplication; thirdly, closer integration of finance of the main-line companies. That integration of finance was necessary if the major economies were to be effected, but it was a very different thing from a complete administrative fusion. The fourth thing that they wanted under rationalisation was to retain healthy competition. That competition was of two kinds. There was what he might call the competition of enterprise, such as existed between the great main-line companies. They must also retain competition of service which could continue even inside co-ordination between road transport and rail, and which must inure to the benefit of the public and of the trader. Much closer working than in the past was visualised between the four main-line companies.

L.N.E.R. PLAN

He then put before the House what he and the board of the London & North Eastern Railway Company believed to be a practical alternative to public ownership. It was not in any sense a death-bed repentance under threat of nationalisation. He first heard of the scheme as long ago as the autumn of 1940. He said the original cost of the main-line tracks might be taken to have been about £800,000,000. If they took interest on that at 4 per cent., that meant £32,000,000 a year, which remained as a burden on the railway companies. The road haulage businesses had no parallel burden at all. The second thing which contributed to the unequal track costs was signalling. Signalling and safety precau-

tions cost the railways £6,500,000 a year. No similar burden rested on the roads, and it was worth noting in passing that the Government Actuary had officially given the figure of the cost to the community of road accidents for the years 1935-38 as £50,000,000. A very small part of that burden fell on the roads. The railways had to signal their tracks and, quite rightly, were made to take the most stringent precautions against accidents. Thirdly, there was the burden of local rates. The railways paid something like £4,500,000 in rates on their track. No similar burden of rates obviously rested on the road hauliers. Of the £4,500,000, 75 per cent. went back to the trader in the form of rate rebates. Those were unfair burdens as between one industry and another.

Replying to a question by Lord Quibell, Lord Balfour of Burleigh said that in 1938 one-third of the whole of the gross receipts of the railways had gone in maintenance of track and remuneration of capital. In the case of the road hauliers' industry the contribution to the Exchequer in licence and petrol duty was one-eighth of the traffic receipts. Of the contribution made to the Exchequer from licence and petrol duty, approximately 30 per cent. only came from the commercial road hauliers' industry; the rest came from private persons owning motor cars and motor cycles.

The L.N.E.R. scheme had been criticised on the ground that it meant only another subsidy. If that was a subsidy, then the road industry already had had a subsidy. But the subsidy, such as it was, would not go to the railways, for under the scheme the whole of it would be devoted to the reduction of rates and would consequently redound to the benefit of the trader. The trader would get the same benefit in his railway rates as he had already had in his road rates.

DETAIL OF SCHEME

The detail of the scheme put forward by the board of the L.N.E.R. was quite simple. The Government would acquire the track of the railways and would stand to the railways in the relationship of landlord to tenant. Landlord and tenant would have each duties and rights. Payment for the assets handed over—that was the track—would be made in Government stock. The board's suggestion was that some impartial tribunal should examine and assess the amount of the payment. The result would follow that the railways would hold a block of Government stock on which they would, of course, receive interest, in exchange for the assets with which they had parted. They would then pay a rent to the Government for the track which they would continue to operate, and the rent would be a figure lower than the interest received on the Government stock. That would be a figure which it would be the duty of the impartial tribunal to assess—it might be £5,000,000, £6,000,000 or £7,000,000, for the sake of example. The whole of that amount would go in reduction of railway rates. It could not be maintained that that was a subsidy to the railways. It would be precisely parallel to the passing on of that kind of rates—local rates—the operation of which was familiar to many of their Lordships. He would not call it a subsidy. If he had to call it anything he would call it an alleviation—an alleviation of a very difficult situation. The Government stock which would be handed over would be blocked. It would not be put on the market, and it would not be sold except in so far as it might be necessary for the railways to realise the stock to pay the expense of new works and to meet new capital expenditure. The Govern-

ment, as landlord, would quite clearly have certain rights of control and consultation. In the way he had explained the two great difficulties which faced the railways, and, indeed, he thought transport in general, would be overcome. With Parliamentary powers they should be able to co-ordinate with road transport, and they should have capital at the cheapest rate, the benefit of which would inure to the trader and the passenger; and any difficulties there were about capital—they might be greater for the L.N.E.R. than for others, for reasons which he need not go into—would be solved.

With those conditions, said Lord Balfour, they were prepared to face the unfettered competition of the "C" licence holder, whose existence was the greatest safeguard against monopoly they could have. If a trader had the right to run his own trucks anywhere he liked, he could not be squeezed between the upper and nether millstones of any monopoly. He asked the Government to consider whether that scheme was not worth looking into, even at this late stage. It was not as though the railways had ever had a chance to get a square deal. They never had got a square deal, and now was the time to see whether they could not get this co-ordination.

There were two great advantages to the Government which would follow. If the whole transport industry was to be acquired, a very large amount of money would have to be raised. The replacement cost of the railways at today's prices might be £2,000,000,000. He was not so sanguine as to suggest that that was the price the Government was likely to pay, but, judging purely from what he saw in the newspapers, a figure of £1,000,000,000 seemed to be, so far as the newspaper scribes could judge, within the range of practical possibility. Then there was the whole of the capital sunk in the road industry. He had not the remotest notion what that might be, but it must run into a great many million pounds. On top of that immense capital sum would come the need for raising capital for future developments. They were going to be formidable. New works had been approved by the board of the L.N.E.R. amounting to over £50,000,000. It had a priority programme of £25,000,000, but there were urgent works of £25,000,000 more. Its programme for new locomotives, carriages and wagons for five years would cost £50,000,000. Electrification schemes, particularly in London, would cost tens of millions of pounds, and new tubes and railways in London (a substantial part of which would be due to works in connection with the L.N.E.R.) would amount to another enormous sum.

RAILWAYS PREPARED FOR RISK

The Chancellor of the Exchequer must surely welcome the opportunity to be relieved of the burden of adding to Government indebtedness hundreds of millions of pounds. Why should the Government not adopt this scheme, if only as a first step—because, after all, it would be a step—towards nationalisation? The Government would become the owner of the track. The Government ultimately could take a monopoly, if it thought it necessary. The scheme had the great advantage, from the Government's point of view, that while the railways tried it out, the equity shareholders of the railway would take the risk. Why should the Government wish to take the risk of great financial loss until it saw how the thing was going to work? The railways were quite willing to take the risk because they believed that, given the square deal which

this would give to them, they could earn the revenue necessary to keep them alive. He did not know for what ills nationalisation was a remedy. It might be that it was a remedy for the ills of bygone days when the railways perhaps had abused their monopoly position. He did not know. However, whatever it was a remedy for now, he believed that it was worse than the disease. Once these eggs were scrambled, they could not be unscrambled. He acquitted the Government of wanting to scramble the eggs merely for the sake of scrambling them, but still he did not believe there was any reason for this nationalisation other than an ancient shibboleth. The railways were rapidly reaching the stage where they were a public service. The road service was younger in experience than the railways were. Evolution was proceeding, and he asked the Government not to jump all its fences until it could see whether that evolution would not achieve the desired result. Finally, might he put forward one last thought which might appeal to the commercially-minded members of the Government? "Give us a chance, and if we fail you will be able to buy us up at a break-up price."

LORD CHANCELLOR'S VIEWS

The Lord Chancellor (Lord Jowitt) said he agreed very largely with the test which Lord Balfour of Burleigh had enunciated. That was to say, it was not primarily a question of ownership but a question of co-ordination — closer co-ordination between the railways and closer co-ordination between road and rail. They could, of course, achieve co-ordination without ownership, but in his experience much the simplest way of achieving that co-ordination was by ownership. Having got ownership, they could then achieve what co-ordination they liked. He would like the House to look at the problem of London transport. He did not say that the London Passenger Transport Board had in all respects succeeded in dealing with all the difficulties, but he did say that thanks to the skill and genius of Lord Ashfield, London transport was in a far better condition than it would have been if there had been a whole mass of unrelated concerns all trying to run their own transport. That, of course, depended on ownership. It was of no use to face the problem of how to co-ordinate road and rail unless they realised to what end they were going to co-ordinate them. The end was the best service they could give to the community.

He (Lord Jowitt) had never been a railway director. He need hardly say he would have loved to have been one because he would have liked to have produced one of those golden keys which allowed one to travel anywhere; but unfortunately they had never cast an eye at him or indeed at any of his friends on that side of the House. He often wondered how a director looked at that sort of problem. He saw little houses backing on to the railway with clothes which had been laundered hanging out to dry. They were getting all the smuts and the dirt from steam trains and the smoke sometimes went into the houses and filled the rooms. He said to himself: "I should like to electrify that line because in that way I should be able to increase the amenities and perhaps tremendously improve the health of the people who live by the side of the railway." Then he looked at his estimates and came to the conclusion that it would involve a great capital expenditure and that he could not see a return of more than 1 per cent. on his money. As trustee for the shareholder, he was

bound to say: "I will not undertake this project." Where could he enter in the balance sheet the greater health, the greater happiness and the greater amenities of the people who lived by the side of the railway? What column in the balance sheet was there for that? That was why they maintained that this service must be recognised as being a great national service ancillary to the general well-being of the people, and particularly of trade and industry.

Lord Balfour of Burleigh asked if that meant that the Government, when it owned the railways, were going to embark on capital expenditure for the sake of amenities without any regard whatever to financial returns.

The Lord Chancellor: Certainly not without any regard to financial returns, but the noble Lord must do it without any regard to amenity. Certainly the Government, in considering whether to embark on capital expenditure, would have to consider first of all the return on their money, but they would be content—and they would be content—with a very much smaller return if they were satisfied that they would thereby increase the health, happiness and amenities of the people.

Replying to Lord Portal's speech, Lord Jowitt said there really was no occasion whatever for another inquiry. The facts were known. They had got to make up their minds what to do. The right place to have the inquiry was in the High Court of Parliament, and the High Court of Parliament in due course would have the opportunity of pronouncing on the Bill to be introduced.

With regard to the question he had been asked about coastal shipping and docks, he would proffer the well-known and ancient Liberal doctrine: "Wait and see." He thought he had better not anticipate.

Debate in Commons

Mr. Winston Churchill (Leader of the Opposition), in the course of his speech in the House of Commons on November 12 in the debate on the motion for an address in reply to the King's Speech, said it was very gratifying to hear the Ministers in the King's Speech admitting their intention to break with their evil past and to go forward and endeavour to alleviate the lot of the housewife. What was the first step of alleviation which they were promised?

It was the nationalisation of the railways and of inland transport. He was not going to pretend he saw anything immoral in the nationalisation of the railways provided fair compensation was paid to the present owners. He professed himself in favour of that policy in 1919, but what happened? Sir Eric Geddes was placed in complete charge of the railways with all the facilities and power which would have accrued to a State-aided nationalised system. What happened? All that he produced in four years was a very bad service for the public, heavy loss to the shareholders, and the worst railway strike ever known except the one preceding the General Strike. He must admit that this practical experience of nationalisation—and they did learn by trial and error provided they profited by their experience—damped—he could not say his usual—his early enthusiasm for that project. But the railways were only part of the problem.

They were a very clearly marked out public service, and one found it difficult to see why the arguments which had been

applied to the Post Office could not equally be applied to the railways but now the whole problem was changed. It was changed by the enormous developments in road transport and haulage. There was a field of complication of the most extraordinary variety. Why the Government should choose this particular moment to throw all this new sphere into confusion and disturbance and make a large addition to the National Debt in order to thrust the clumsy butter-fingers of the State into all this intricate apparatus could not be imagined, still less explained. And that it should be represented as a measure for alleviating the inconveniences and hardships of the housewife—that at any rate was a preposterous fraud. He could assure the Government that the opposition would meet the proposals for the nationalisation both of inland transport and of electricity with strenuous and uncompromising opposition.

Mr. C. R. Attlee (Prime Minister) said he did not expect any objection on principle to the nationalisation of transport. Mr. Churchill had recalled his own past in the matter. He had one of those flashes of insight which, unfortunately, were so often disregarded by his own party. (A Member: "He was a Liberal then.") He had been, he believed, a Liberal; at any rate it had been disregarded by the party to which he had then belonged and by the party to which he now belonged. They had been often in coalition. Mr. Churchill had advocated the nationalisation of railways in 1918. He had had to wait 28 years for the Labour Party to bring forward legislation to make a reality of his wise prescience. They had to bring Mr. Churchill up to date. Mr. Churchill justly pointed out that they could not deal with the railways just by themselves.

He (Mr. Attlee) recalled that they had a London Passenger Transport Act passed by the Lord President of the Council (Mr. H. Morrison). It had been designed to deal with London, because, if they had not dealt with London, so far from it being the shoving of butter-fingers into a mess, the butter was so thick that nothing would have moved in it. Therefore, that Bill, even after 1931, had had to be adopted by the then Coalition Government and put through, by a predominantly-Conservative Government. That Act gave expression to the truth that the various forms of transportation must be complementary and not competitive. They could not afford to waste on competition services like that. In the interests of the people and the industries of this country, they must have the most efficient and economical organisation of transport.

Questions in Parliament

Central Uruguay Railway

Wing-Commander E. R. Millington (Chelmsford—Lab.) on November 6 asked the Secretary of State for Foreign Affairs whether he was now in a position to make a statement on the allegations of breaches of the Anglo-Uruguayan Trade and Payment Pact by the British-owned Central Uruguay Railway.

Mr. Hector McNeil (Minister of State) stated in a written answer: This subject has again been carefully and extensively examined, and His Majesty's Government is satisfied that the Central Uruguay Railway has committed no breaches of the Anglo-Uruguayan Trade & Payments Agreement of 1935.

Notes and News

G.W.R. Cheap Day Tickets.—The G.W.R. will introduce on and from December 3 cheap first and third class day fares to many stations within a 20-mile radius of populous centres. They will be available on Tuesdays, Wednesdays, and Thursdays from important provincial stations, and some stations in the London suburban area.

Assistant Accountant Required.—An assistant accountant is required by the Nigerian Government Railway for one tour of 18 to 24 months with possible permanency. Candidates, not over 32, must have matriculated and have had suitable accounting experience or be Associate Members of one of the recognised appropriate professional bodies. See Official Notices on page 595.

Locomotive Draughtsman Required.—A locomotive draughtsman is required by the Iraqi State Railways for a tour of three years in the first instance. Candidates must have served an apprenticeship in the workshop of a British railway or firm of locomotive builders, and have a good knowledge of modern steam locomotive design and construction. For full details see Official Notices on page 595.

Closing and Re-Opening of L.N.E.R. (Great Eastern) Suburban Stations.—In connection with the L.N.E.R. Liverpool Street and Fenchurch Street to Shenfield electrification scheme now in progress, Coburn Road Station will be closed permanently after the departure of the 1.20 a.m. train from Liverpool Street to Brentwood on December 8. The nearest stations as from December 9 will be Mile End (L.P.T.B. Central Line) and Bow Road (L.N.E.R.). Bethnal Green Station will cease to be served by trains running between Liverpool Street, Stratford, and beyond on and from December 8, after the departure of the 1.20 a.m. train from Liverpool Street to Brentwood, but will continue to be served by trains on the

Liverpool Street—Enfield Town and Liverpool Street—Chingford lines, and some Hertford line trains. The nearest station will be Bethnal Green (L.P.T.B. Central Line). As from December 9, Bow Road Station (L.N.E.R.) will be re-opened for passenger and parcels traffic.

"Go Slow" Strike on G.W.R.—The "go slow" strike among G.W.R. goods staff which began at Paddington, and affected Acton, Brentford Town, and Greenford, spread on November 19 to Park Royal, Hayes, and South Lambeth. The total number of men involved is 2,000.

Accountant Required for the Gold Coast.—An accountant is required by the Gold Coast Government Railway for two tours of 18 to 24 months with possible permanency. Candidates, not over 35 years, must have a thorough knowledge of book-keeping, with practical experience in railway accounting work and be capable of taking charge of any section of a railway accounting organisation. See Official Notices on page 595.

Colonial Government Appointment.—An assistant transportation manager is required by the Malayan Government for the Railway Department, for one tour of three years with prospect of permanent and pensionable appointment. Candidates, aged 30 to 35, must be Associate Members of the Institute of Transport or hold equivalent professional or academic qualification. For full details see Official Notices on page 595.

New L.N.E.R. Control Telephone System.—The L.N.E.R. recently has modernised the telephone system for the traffic control organisation based on the District Superintendent's office in Edinburgh. Automatic dial telephones, capable of ringing and speaking to individual signal boxes, have replaced the former arrangements whereby several boxes were on the same circuit, and a code ringing system was necessary. Incoming calls to the control office are indicated by lamps

to avoid the noise of bells. The system also provides an intercommunication circuit between controllers supervising separate sections of the line, so that they can consult without talking across the room. Telephone communication is provided with the neighbouring control office.

Re-Opening of Stations, North Eastern Area, L.N.E.R.—On October 7, the L.N.E.R. restored the weekday passenger services at Longhoughton, Little Mill, Christon Bank, Newham, Lucker, Goswick, and Scremerston, on the main line

British and Irish Railway Stocks and Shares

Stocks	Highest 1945	Lowest 1945	Prices	
			Nov. 19, 1946	Rise/ Fall
G.W.R.				
Cons. Ord.	60½	47½	56½	— ½
5% Con. Pref.	124½	104½	121½	— 3
5% Red. Pref. (1950) ..	107½	101½	103½	— 1
5% Rt. Charge	137½	120	136½	— 4
5% Cons. Guar.	135½	117	133½	— 2
4% Deb.	118	106	124½	— 2
4½% Deb.	119½	108	125	— 3½
4½% Deb.	124½	111½	127½	— 3
5% Deb.	138	124	139½	— 3
2½% Deb.	83	74½	93	— 2½
L.M.S.R.				
Ord.	33	23½	28½	+ ½
4% Pref. (1923)	65	50	60½	— 1
4% Pref.	80½	69½	81½	— 1½
5% Red. Pref. (1955) ..	106½	99½	103½	— 2
4% Guar.	106½	97	104½	— 2
4% Deb.	110½	102	114½	— 2
5% Red. Deb. (1952) ..	110½	103½	106½	— 2
L.N.E.R.				
5% Pref. Ord.	8½	5½	6½	+ 1½
Def. Ord.	4½	2½	3½	+ ½
4% First Pref.	62½	49½	55½	— 1
4% Second Pref.	33½	24½	27	+ 1½
5% Red. Pref. (1955) ..	103	96	100½	— 3½
4% First Guar.	104½	95	103½	— 1½
4% Second Guar.	97	89½	98½	— 1
3% Deb.	91½	82½	100½	— 1½
4% Deb.	109½	101	114½	— 2
5% Red. Deb. (1947) ..	103½	100	99	—
4½% Sinking Fund				
Red. Deb.	106½	103	105½	— 2
SOUTHERN				
Pref. Ord.	79½	63	74½	— 1½
Def. Ord.	27	20½	22½	+ 1½
5% Pref.	124½	104	120½	— 1
5% Red. Pref. (1964) ..	117	107	113½	— 1
5% Guar. Pref.	135½	117	133½	— 2
5% Red. Guar. Pref. (1957)	117	106½	113½	— 2
4% Deb.	117	104½	124½	— 1
5% Deb.	137	124	137½	— 2
4% Red. Deb. (1962- 67)	112	104½	111½	— 2
4% Red. Deb. (1970- 80)	113½	104	113½	— 2
FORTH BRIDGE				
4% Deb.	106	103	106½	— 2½
4% Guar.	106	101	102	— 3
L.P.T.B.				
4½% "A"	125	117	130½	— 3
5% "A"	135	127	139½	— 3
3% Guar. (1967-72) ..	100	97½	107	— 1
5% "B"	125½	115	126½	— 2
5% "C"	70	58	64½	+ 2
MERSEY				
Ord.	37	31½	32	—
3% Perp. Pref.	72½	68½	73½	— 2½
4% Perp. Deb.	104½	104	115	— 2½
3% Perp. Deb.	84	78½	95½	— 2½
IRELAND*				
BELFAST & C.D.				
Ord.	8½	6	7½	—
G. NORTHERN				
Ord.	34	24½	37½	+ ½
Pref.	52½	42½	59	— 1
Guar.	80	68	92	— 1
Deb.	97½	87½	104½	+ ½
IRISH TRANSPORT				
Common	—	—	18/9	— 3½
3% Deb.	—	—	105	+ ½

* Latest available quotation



Viscountess Mountbatten receiving a coffee table from Mr. R. M. T. Richards, Traffic Manager, Southern Railway, after presenting awards to St. John Ambulance Brigade members at Brunswick Hall. The ceremony was reported in our November 15 issue

Crown Agents for the Colonies

COLONIAL GOVERNMENT
APPOINTMENTS

APPLICATIONS from qualified candidates are invited for the following post:—
ACCOUNTANT required by the Gold Coast Government Railway for two tours of eighteen to twenty-four months, with possible permanency. Salary £400, rising to £720 a year. Commencing salary according to qualifications, experience and war service. On salary of £400 a year there is a local allowance of £60 a year and for married men a separation allowance of between £84 and £204 a year according to number of dependents. Outfit allowance £60. Free passages and quarters. Candidates, not over 35 years, must have a thorough knowledge of book-keeping, with practical experience in railway accounting work, and be capable of taking charge of any section of a railway accounting organisation. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/16204 on both letter and envelope.

LOCOMOTIVE DRAUGHTSMAN required by the Iraqi State Railways for a tour of 3 years in the first instance. Salary Iraq dinars 50 a month plus high cost of living allowance between I.D.12 and I.D.15 a month, according to number of dependents. (I.D.1 = £1.) Free passages. The post is not pensionable, but there is a Provident Fund. Candidates must have served an apprenticeship in the workshop of a British Railway or firm of Locomotive Builders, and have a good knowledge of modern steam locomotive design and construction. A knowledge of diesel traction would be an advantage. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/12841, on both letter and envelope.

between Newcastle and Berwick. These stations had been closed to passengers since May 5, 1941, as a wartime measure. Hart Station, near Hartlepool, which had been closed to all traffic since July 28, 1941, was also re-opened, on weekdays only, as from October 7.

Southern Railway Lecture & Debating Society.—On November 28, Mr. A. Dean, Assistant Chief Civil Engineer, Southern Railway, will speak on "The Part of the Clerical Staff in the Chief Civil Engineer's Department." Mr. V. A. M. Robertson, Chief Civil Engineer, will take the chair. The lecture, which begins at 5.45 p.m., will be held at the Chapter House, St. Thomas Street, S.E.1.

The Midland Uruguay Railway Co. Ltd.—Higher rates and fares introduced on August 1 last year contributed to an increase of £6,719 in gross receipts for the 12 months ended June 30, which totalled £224,254. Working expenses for the year increased slightly on account of higher wages and fuel costs, the total of £207,676 comparing with £204,746 in the previous year. Net receipts of £16,578 show an increase of £3,789.

Temporary Reduction in L.M.S.R. Holyhead—Kingstown Sailings.—The L.M.S.R. announces that on account of repairs to the ss. *Hibernia*, it is necessary temporarily to reduce the service between Holyhead and Kingstown. The sailings on weekdays and Sundays during the next two or three weeks will be as follows: Holyhead depart 3.45 a.m. (boat train leaves Euston at 8.40 p.m.); Kingstown depart 9.30 a.m. (boat train for Euston leaves Holyhead at 1.45 p.m.).

Collision near Bar-le-Duc, French National Railways.—In the early morning of November 12 a goods train collided with the rear of a stationary local passenger train at Revigny, near Bar-le-Duc, on the main line from Paris to Strasbourg. It is officially announced that 31 persons were killed and 30 injured. The accident occurred in dense fog and the

Crown Agents for the Colonies

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ASSISTANT ACCOUNTANT required by the Nigerian Government Railway for one tour of 18 to 24 months with possible permanency. Salary £400, rising to £720 a year. Commencing salary according to War Service. On salary of £400 a year there is a local allowance of £60 a year and for married men a separation allowance of between £84 and £204 a year according to dependents. Outfit allowance £60. Free passages and quarters. Candidates, not over 32, must have matriculated and have had suitable accounting experience, or be Associate Members of one of the recognised appropriate professional bodies. Preference will be given to candidates who possess a degree in either economics or commerce of one of the recognised universities. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/16797, on both letter and envelope.

REQUIRED by Major Oil Company in South America, Boiler Inspector for refinery and oilfield boilers. Candidates must have thorough knowledge of boilers in general, also some knowledge of modern type oilfield boilers, be prepared to train and supervise boiler repair crews and make internal inspections. Age limit 35 years. Successful candidate would be offered 3 years' contract with prospect of permanency, free passage to and from Venezuela on completion of contract, £75 outfit allowance and a salary depending on age and experience from £900 per annum. Selected candidates required to attend London for interview and medical examination as to fitness for tropical service. Apply in writing, stating age and full details of education, qualifications and experience to Box ZE.615, DEACONS ADVERTISING, 36, Leadenhall Street, E.C.3.

three rear coaches of the passenger train were telescoped; the driver and fireman of the goods train were killed. It is reported that the locomotive was one which had been acquired recently from the United States and had not yet been equipped with a speedometer or cab-signalling apparatus. The goods train is said to have passed two signals at danger, and to have collided with the passenger train at a speed of about 31 m.p.h.

The Silverton Tramway Co. Ltd.—The net profit of this company for the year ended June 30 last was £37,145, an increase of £999 on the previous year. After adding £5,000 to reserve for replacement of rolling stock, and £5,390 to reserve account, bringing the total reserve to £25,000; and after payment of dividends and other charges, the balance carried forward is £9,017. The amount brought in from 1944-45 was £8,972.

Ateliers de Constructions Electriques de Charleroi.—The British Manager of Ateliers de Constructions Electriques de Charleroi, Belgium, Mr. John H. Bunting, who has been in charge of the British office since it was opened in 1921, and who has now passed the company's age limit, will retire at the end of this year. Mr. W. H. Wadmore, who for many years has been associated with the management of that office, will assume, as from January 1, 1947, the position of British Manager.

Gill Sans Lettering on the L.N.E.R.—A new and revised edition has been issued of the L.N.E.R. specimen lettering book for station notices, direction signs, and similar material. The book shows the Gill Sans medium and light alphabets and figures, painted on a squared background to assist in the accurate reproduction of the letter proportions. Medium lettering is standardised for all purposes except internally illuminated signs, and for notices where maximum legibility is less important than economy of space. The book shows, also, the medium and light styles of the L.N.E.R. totem, and the standard direc-

Crown Agents for the Colonies

COLONIAL GOVERNMENT
APPOINTMENTS

APPLICATIONS from qualified candidates are invited for the following post:—
ASSISTANT TRANSPORTATION MANAGER required by the Malayan Government for the Railway Department, for one tour of three years with prospect of permanent and pensionable appointment. Salary \$850 a month (Malayan dollar = 2s. 4d.). Free passages. Outfit allowance £60 on first appointment. Children's allowances at the rates of 3/0 a month for the first child and 5/0 for the second. Candidates, aged 30 to 35, must be Associate Members of the Institute of Transport or hold equivalent professional or academic qualification. They should have served as special traffic apprentices with one of the British Railways selected under their training schemes by competitive examination, or have been engaged direct from a university, and must subsequently have held a responsible executive position. Apply at once by letter, stating age, whether married or single and full particulars of qualifications and experience and mentioning this paper to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/16704, on both letter and envelope.

CIVIL ENGINEERING ASSISTANTS (Senior and Junior) experienced in surveying and levelling, design of structures, railway layouts, contract documents and bills, etc., required by Main Line Railway Company.

Engagements on temporary basis at from £7 7s. to £10 10s. per week, plus War Advance (at present 28s. per week) according to qualifications and experience. Applications, stating age, experience, etc., with copies of recent testimonials to Box No. 29, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

tion arrow. The dimensions of the arrow head and tail are the same in all applications, any adjustment in the size of the device being made by altering the length of the shaft.

East Indian Railway Company.—It was notified recently that on September 30, 1946, a total sum of £9,570,918 2s. 11d. was invested for the purpose of providing a sinking fund in respect of the annuities class "B"; that on the same date a total sum of £2,162,875 1s. 5d. was invested for the purpose of providing a sinking fund in respect of annuities class "C"; and that on the same date a total sum of £4,109,162 4s. 0d. was invested for the purpose of providing a sinking fund in respect of annuities class "D."

Staggered Working Hours in Central London.—At a conference called by the Minister of Transport at the Middlesex Guildhall on November 19, Lord Ashfield, Chairman of the London Passenger Transport Board, said that the problem of rush-hour traffic could not be solved merely by increasing the numbers of buses and trains. The Minister, therefore, had called a conference to discuss the adjustment of working hours in Central London to relieve the present traffic peaks. In most cases little more would be involved than a 15-min. change in present times of leaving office, home, and factory, and wartime experience had shown that real relief could be obtained in this way. The proposals were explained in detail by Mr. A. B. B. Valentine, Chief Commercial Officer, London Transport.

Forthcoming Meetings

November 27 (Wed.).—The Institute of Traffic Administration (London Centre) at Livingstone House, 42, Broadway, S.W.1. 7 p.m. "The L.M.S.R. and the Trader," by Mr. W. H. Vine, A.M.Inst.T., Commercial Assistant, District Goods Manager, Broad Street.

Railway Stock Market

The compensation terms for railway stockholders have encountered widespread criticism. It is apparent that the Government is attempting to force through rapid and "cheap" nationalisation at the expense of stockholders. The strong case made out for a public inquiry by an impartial tribunal, before any Bill for transport nationalisation is introduced to Parliament, has been rejected. Moreover, there is to be no independent tribunal to determine compensation for stockholders. Market prices are to form the basis for compensation, namely, Stock Exchange prices ruling during the first week of November, or the average prices for the six months preceding the General Election last year. So far no explanation has been advanced of the reason for taking as the basis prices ruling in the first week prior to the new session of Parliament.

Since the middle of October there have been two main factors influencing home railway stocks, namely, (1) the publication of the railways' case against State ownership and the request for an inquiry by an independent tribunal into transport; and (2) the decision to redeem Local Loans. Following the latter, and the general rise in British Funds, other high class investments have recorded a widespread advance, in which home railway prior charges and senior preference stocks participated prominently. Had it not been for the latter, compensation as based on market prices would have been extremely unfair to holders of prior charges and senior preference stocks. The following table records the Government's compensation price, the prices on Monday last, those ruling before the Local Loans redemption decision, and

those current prior to the railways' statement against State ownership:—

	Compensation	Price on Monday	Pre-Local Loans news	Pre-Rlys. statement
G.W.R.				
Ordinary ...	59½	56	59	57½
5 per cent. pref. ...	125½	120½	112½	112½
5 per cent. guar. ...	137	132½	126	125½
4 per cent. deb. ...	128½	123½	116	115½
L.M.S.R.				
Ordinary ...	29½	28	29	29
1st pref. ...	85½	80½	82	80
192½ pref. ...	62½	59	61	56½
4 per cent. deb. ...	118½	115	110	109½
L.N.E.R.				
Prefd. ...	7½	5½	5½	5½
Defd. ...	3½	2½	2½	2½
1st pref. ...	58½	54½	58½	55½
2nd pref. ...	29½	26½	28	27½
Southern				
Prefd. ...	77½	74½	74½	72½
Defd. ...	24	20½	22½	22½
5 per cent. pref. ...	124½	119½	111	110½
4 per cent. deb. ...	128½	122½	115½	114½
London Transport				
"C" ...	67½	64½	58½	58½
4½ per cent. "A" ...	133½	132½	128	127
5 per cent. "A" ...	142½	142½	137½	137

It will be recalled that towards the end of last week home railway stocks weakened on a newspaper report that hopes of fair compensation would not be realised. Subsequently prices showed a rallying tendency on revived hopes that the question of compensation would have to be decided by an independent tribunal. This better tendency was gaining ground on Monday this week, and gave indications of continuing. Had the Minister of Transport not decided to issue his statement on compensation, it is probable that ordinary and junior preference stocks would have risen above the compensation values now announced. It will be recalled that the railways' statement regarding nationalisation valued the assets of the railways at over £2,000,000,000.

The total of compensation for stockholders, based on the terms now announced, is little more than half this amount. Not only has the Government, in arriving at the compensation basis, thrown over the railways' legal right to standard revenue as defined in the 1921 Act, but it has apparently had little regard to the basis of the existing fixed rental agreement.

It is difficult not to arrive at the conclusion that the Government decided against setting up an independent tribunal to determine compensation partly because the latter would be a lengthy business. Consequently, stockholders are to suffer because of an attempt by the Government to gain time. It should be borne in mind that the railways, in agreeing to the existing fixed rental terms, emphasised that they had in no way given up their right to standard revenue as defined in the 1921 Act. It is clear that there will be widespread opposition to the Government's policy and plans. In particular the proposed compensation terms are unfair to London Transport "C" and Southern preferred ordinary stocks.

As was to be expected, home railways were adjusted to the values of the Government's compensation terms. Later, however, selling was in evidence, the view gaining ground that it might be the best course to sell now and reinvest, because assuming the Chancellor of the Exchequer is able to carry his cheaper money policy still further, prices of all worth-while investments may in future go considerably above current levels. Elsewhere, Argentine rails have moved within narrow limits, awaiting news of the capitalisation of the new Argentine company.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ended	Traffic for week		No. of Week	Aggregate traffic to date			Shares or Stock	Price:		
				Total this year	Inc. or dec. compared with 1944-5		Totals		increase or decrease		Highest 1945	Lowest 1945	November 19, 1946
							1946-7	1945-6					
South & Central America	Antofagasta	834	10.11.46	35,750	+ 9,140	45	£ 1,513,683	£ 1,326,070	+ £ 187,610	Ord. Stk.	12	8½	10½
	Arg. N.E.	751	10.11.46	ps.298,700	- ps.27,700	19	ps.5,900,200	ps.5,831,700	+ ps. 68,500	"	10	5½	17
	Bolivar	174	Oct., 1946	4,543	+ 71	43	42,952	48,577	- 5,625	6 p.c. Deb.	8½	5½	6½
	Brazil									Bonds	25	17	29
	B.A. Pacific	2,771	9.11.46	ps.2,360,000	+ ps.110,000	19	ps.41,893,000	ps.38,040,000	+ ps.3,853,000	Ord. Stk.	7	5	7
	B.A.G.S.	5,080	9.11.46	ps.3,161,000	+ ps.345,000	19	ps.61,008,000	ps.57,534,000	+ ps.3,474,000	Ord. Stk.	13½	10½	13
	B.A. Western... ..	1,924	9.11.46	ps.1,241,000	+ ps. 39,000	19	ps.22,788,000	ps.21,496,000	+ ps.1,292,000	"	12½	9½	16
	Cent. Argentine Do.	3,700	9.11.46	ps.3,292,100	+ ps.246,400	19	ps.59,077,12½	ps.57,559,150	+ ps.1,517,975	"	9½	7	10
	Cent. Uruguay	970	9.11.46	39,069	- 847	19	682,896	662,812	+ 20,084	Ord. Stk.	7½	4	8½
	Costa Rica	262	Aug., 1946	36,220	+ 4,160	9	73,313	61,153	+ 10,160	Stk.	16½	13	9
	Dorada	70	Sept., 1946	23,100	- 6,700	39	279,975	273,135	+ 6,740	1 Mt. Deb.	103	102	102½
	Entre Rios	808	9.11.46	ps.399,500	- ps.65,500	19	ps.7,844,900	ps. 8,013,800	- ps. 168,900	Ord. Stk.	7½	4½	6½
	G.W. of Brazil	1,030	9.11.46	37,000	+ 4,100	45	1,284,100	1,120,300	+ 163,800	Ord. Stk.	30-	23½	22-
	Inter. Ccl. Amer.	794	Sept., 1946	\$721,193	- \$105,470	39	\$8,024,802	\$6,867,611	+ \$1,157,231	"			
	La Guaira	22½	Oct., 1946	4,672	- 1,463	43	56,641	62,380	- 5,739	5 p.c. Deb.	78	70	60
	Leopoldina	1,918	9.11.46	67,535	+ 7,964	45	2,730,471	2,397,926	+ 332,545	Ord. Stk.	4½	3½	4
	Mexican	483	31.5.46	ps.1,464,000	+ ps.459,100	22	ps.17,703,200	ps.13,441,600	+ ps.5,220,200	Ord. Stk.	4	4	4
	Midland Uruguay Nitrate	319	Oct., 1946	18,562	- 791	17	80,166	75,014	+ 5,152	"			
	N.W. of Uruguay	382	15.11.46	9,482	+ 1,189	46	187,668	164,215	+ 23,453	Ord. Sh.	75½	67½	71½
	N.W. of Uruguay	113	Sept., 1946	6,013	+ 1,441	13	17,534	15,755	+ 1,779	"			
	Paraguay Cent.	274	8.11.46	\$60,850	+ \$6,125	19	\$1,142,741	\$1,142,815	- \$73,926	Pr. Li. Stk.	79½	77	73½
	Peru Corp.	1,059	Oct., 1946	153,237	+ 11,145	17	629,700	\$64,925	+ 64,775	Pref.	10½	7½	8
	Salvador	100	A. g., 1946	c108,000	+ c14,000	9	c190,000	c189,000	+ c1,000	"			
	San Paulo	153½	Oct., 1946	6,895	+ 3,870	18	20,155	9,690	+ 10,465	Ord. Stk.	60½	50½	119½
	Taltal	156	Oct., 1946	50,072	+ 2,399	19	969,578	860,654	+ 108,924	Ord. Sh.	17-	1	22½
	United of Havana	1,301	9.11.46	1,366	- 919	17	5,210	7,348	- 2,138	Ord. Stk.	3	1	1½
	Uruguay Northern	73	Oct., 1946							"			
	Canada	Canadian National	23,482	Sept., 1946	8,607,000	- 252,500	39	72,529,500	81,830,000	- 9,300,500	"		
Canadian Pacific		17,037	14.11.46	1,575,000	+ 123,750	45	63,472,750	69,305,750	- 5,833,750	Ord. Stk.	24	14½	17
Various	Barsi Light†	202	Sept., 1946	15,112	- 1,500	26	144,427	131,265	+ 13,162	Ord. Stk.	131	123	113½
	Beira	204	Aug., 1946	92,426	+ 16,315	48	859,846	846,863	+ 12,983	"			
	Egyptian Delta	607	7.11.46	21,119	+ 2,295	31	351,538	327,013	+ 24,525	Pr. Li. Stk.	10	8½	5
	Manila									B. Deb.	71	55½	64
	Mid. of W. Australia... ..	277	Sept., 1946	18,676	+ 2,858	13	48,623	45,288	+ 3,335	Inc. Deb.	97½	85	70
	Nigeria	1,900	Sept., 1946	355,942	+ 105,19	26	2,251,155	1,316,308	+ 934,807	"			
	Rhodesia	2,445	Aug., 1946	484,152	+ 21,858	48	5,633,516	5,552,569	+ 8,943	"			
	South African	13,323	12.10.46	1,110,631	+ 60,102	28	31,198,111	27,937,876	+ 3,260,235	"			
	Victoria	4,774	Mar., 1946	1,351,280	+ 4,246	—	—	—	—	"			

† Receipts are calculated @ 1s. 6d. to the rupee